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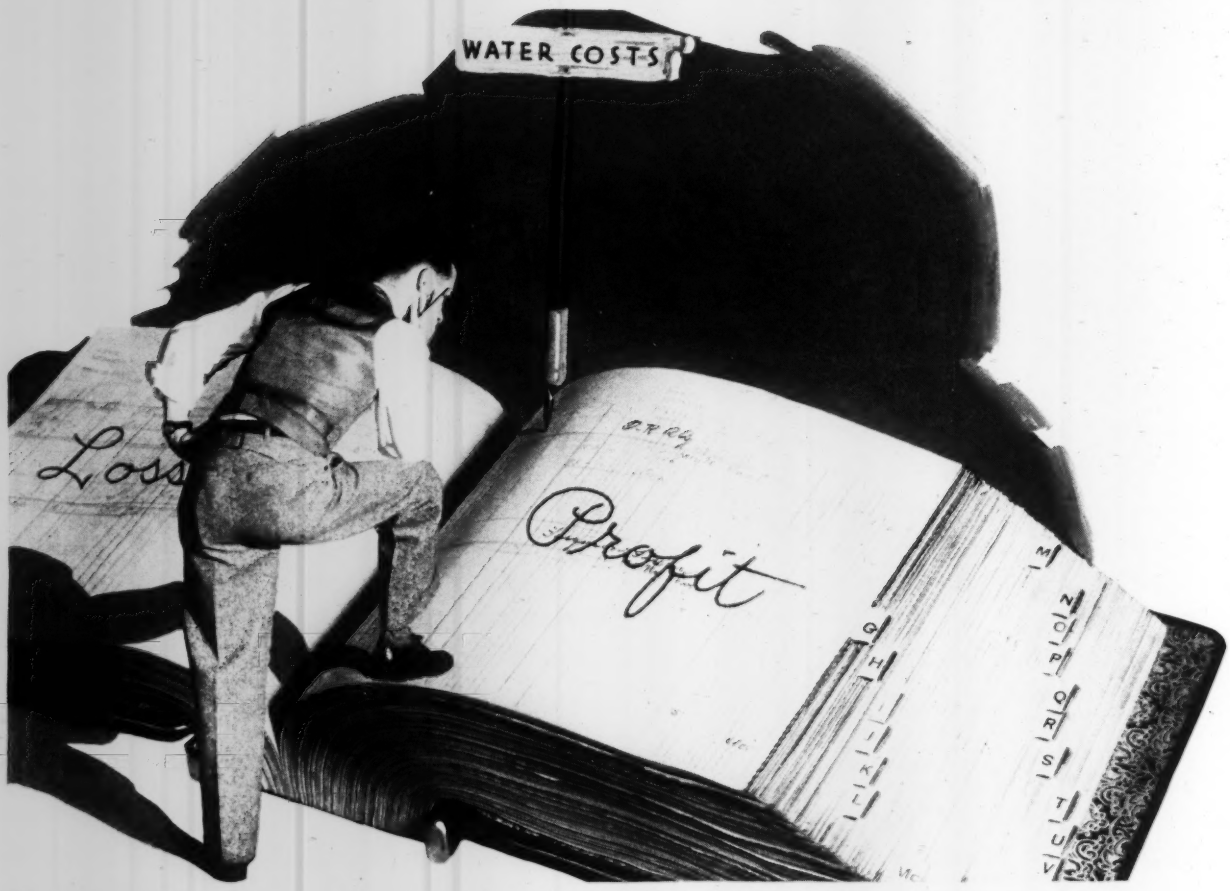

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F. E. Schmitt, Editor

DECEMBER 17, 1931

Progress in Sight

ONE happy event of the past week is that the President's recommendation for the establishment of a mortgage discount bank system was quickly followed by the introduction of a House bill to carry the proposal into effect. No active opposition to the plan is on the horizon, and so the outlook is fair for early realization of the project which when proposed last spring by the National Association of Real Estate Boards seemed a rather distant dream. Construction should gain stability through a discount-bank system, as it would eliminate the sharp changes from a free to a hard-frozen mortgage market. The individual would gain resource through having his home investment made partly liquid, and perhaps the general credit structure would gain most of all, which means general public benefit. The ultimate working of the system and its effect on the price of realty funds remain to be developed by experience, but its present value is so large as to warrant every hope for early enactment of the bill.

Not Necessary Now

ANY major shifting of control of the building and other construction activities of the federal government during the present emergency as recommended in the President's message to Congress appears quite unnecessary. No great economies are obvious and the disorganization of activities due to such a change might delay rather than speed construction work. If speeding up of federal construction operations during the depression is the object it can be accomplished by the appointment of an administrator of public works with powers as wide as those of the director general of transportation during the war period; but if the object is a permanent segregation of public construction such as is proposed in the long-considered plan for a department of public works the proposal is untimely. No picking out bodily of bureaus here and there and grouping them in a new branch of the government will be satisfactory. The organization of such a new department needs to be much more carefully worked out. And the present is no time to put such a load on Congress; it has too many more urgent matters needing its careful consideration.

As to the Mississippi

SO SOON as Congress has dealt with the urgent questions of finance and international relations, the Mississippi flood-control situation is likely to claim its attention. The issue has become highly complex. Serious difficulties have developed in carrying out the project adopted by the Jones-Reid act of four years ago, and since the passing years bring another high flood into ever nearer perspective it is important that a sound plan backed by adequate authorization and money be established at the earliest possible moment. The physical work that has been done along the river has been well done, but it is far from being complete, and its stretches of low levee invite rather than guard against a flood disaster. The diversion floodways are an unsolved problem, just now in the courts. Confidence in the effectiveness of the project has not established itself in the valley as yet, the methods by which the 325 million dollar project was put on the statute books and approved by a handpicked review board have not been forgotten. The Cairo region and lower basins still have strong reason for feeling unsafe. Altogether, widespread feelings of anxiety will persist until a truly impartial study of the project is made. Congress therefore has a major task to perform in bringing final order into the undertaking.

Needless Expenditure

GENERAL BROWN'S conclusions as to the needlessness of a canal across Nicaragua will find wide approval. The capacity of the Panama Canal is ample for years to come and can be increased by the construction of a third set of locks at a cost of $140,000,000. The only justification for a second canal, then, could be found in its now doubtful advantage in time of war, its provision of a somewhat shorter route between Atlantic and Pacific ports, and its value in eliminating delays to shipping in case the Panama Canal should be closed by slides or other accident. Set over against these advantages is the estimated cost of obtaining them, *more than seven hundred million dollars*. At no time would such an expenditure be justified for so small a gain, assuredly not at the present time. General Brown is to be congratulated upon his stand against the views of the military alarmists and of others who would like to see the government undertake the digging of another canal in the hope that they might derive personal profit or glory from its construction.

Holding Up Work

OBSTRUCTIONIST tactics have halted progress on the San Gabriel flood-control project, at the very time when it is ready for construction to begin in accordance with a revised plan. Gold-mining claims within the canyon suddenly developed tremendous value when the site was definitely selected. The asserted values are considered grossly excessive by the district, but offers of settlement for smaller sums have been refused. As a result, no-trespass signs backed by a court order are

blocking men from the further exploratory work necessary to secure state approval of the site. This has happened after a long series of earlier difficulties had been cleared away—the bond issue released by supreme court decision, and the revised plan worked out for a series of dams to take the place of the abandoned high masonry structure. As a result millions of dollars are now lying idle and hundreds of men are kept from work. Such last-minute tie-up of public funds is opposed to the public interest, and deserves only the minimum consideration required for its legal disposition. If similar dilatory proceedings are objectionable under ordinary circumstances, they are even less tolerable under present conditions, where the release of public funds is essential to employment of idle workers.

A Practical Ideal

RECENT statements from the President's Conference on Home Building and Home Ownership are useful in calling to mind the obstacles and discouragements that beset building. Housebuilding suffers from difficulties of finance, design and construction, from absence of value certification, from the probability of rapid deterioration, from exorbitant repair and modernization costs. These obstacles can be overcome, or at least their effects minimized, through study of their origin and the devising of means to render them harmless. The conference therefore had a vital purpose. But home ownership is an unrelated purpose. There was a time when it was a practical ideal that every family should own its home, but that time is gone. Men have become nomadic, and experience teaches them the unwisdom of fettering themselves by home investment. Promotion of home ownership therefore seems an empty ideal. The intensely practical objective of promoting better and sounder housebuilding deserves to be freed of such encumbrance. Far better to study ways and means by which the renting of houses and apartments can be made efficient and satisfying.

Transportation Failure

EVERYDAY observation shows that the ideal of giving each worker an opportunity to rear his own home in the open spaces can never be realized under present transportation practice. Existing systems work after a fashion in the moderate-sized city, but fail in large cities. All improvements in transportation devices and methods to date have not overcome the difficulties of rush-hour mass transportation. Rapid-transit, so called, is as great a failure as surface transportation, chiefly perhaps because it has always been so operated as to reach an early capacity limit. With present facilities of transportation, large cities find the suburban plan of living impossible except for a modest minority. Hence, even before they attain to the condition of being "large," they turn to apartment living as more convenient and efficient. For the present, then, the ideal of the little garden-city home for the city worker seems destined to remain an unreachable ideal. It may become more real when city transportation methods are made truly efficient.

The Fourth Ingredient

IN BUILDING and bridge construction the hazard of specifying concrete by strength alone has long been known, though in practice sometimes forgotten. Strong aggregate and low water ratio may give the specified strength with a mix too lean for weather-resistant density. In discussion of concrete pavements at the Highway Research Board meeting last week the same theme was illuminated from the roadbuilder's side. It was reported that frequently the strength specification of concrete, especially when cements of high early strength were used, has resulted in a concrete deficient in durability, though meeting every strength requirement. This is true not only because the lean concrete is less resistant through its open texture but also because its lack of density allows the shortcomings of a weak aggregate to appear. Wherever density or durability is a factor in concrete service—which is to say virtually everywhere—strength alone should not govern the proportioning of concrete. Plenty of warning examples support this principle. It suggests that good concrete requires more than cement, aggregates and water; a fair amount of practical intelligence should be included as the fourth ingredient.

Ten Years of Planning

A FORMAL meeting on Dec. 11 marked the conclusion of the remarkable undertaking, begun in 1921, known as the Regional Plan of New York and Its Environs. The ten years during which the work went on have been years of hard and intelligent effort, fruitful of results. We believe that for many decades the work will continue to shape the growth of the region directly concerned, and perhaps in even greater measure will guide municipal and regional planning elsewhere, abroad as well as here.

Begun on the urging of a small group of idealists, the undertaking was fortunate in finding strong financial support on the part of a few public-spirited men of large means. Its purposes, however, remained largely unknown to the public; its methods were strange, its value was questioned. Few outside of the circle of those directly engaged believed that lasting results would be attained, for it seemed absurd to hope that private effort without the participation of public officials could prove effective. Even the publication of the monumental "Graphical Regional Plan" which gave the first part of the final results, made little stir. The concluding volume, just published, may for the moment attract equally little attention. Nevertheless the final accomplishment of the purposes for which the Regional Plan was organized is an event of great importance in the history of municipal and regional evolution.

Quietly though the work proceeded, it soon began to have tangible effect, and by now it may fairly be said to be a controlling influence in the development of the metropolitan region. It has shaped many official views and decisions. Consciously or unconsciously, public authorities have utilized it in laying out and executing improvements. Such influence seems certain to increase for years to come. Not only the hundreds of public authorities in the area concerned but also private individuals will refer to it for guidance in their building and development operations.

In the past, planned control of city growth has usually been concerned with new or relatively youthful communities. Attempts to work out a comprehensive scheme of guidance for the further development of a large city have been rare. Even the most notable instances, as

London and Chicago, were limited to one city or to a coherent region. The greater problem of developing a plan for an entire metropolitan region had virtually never been attempted before the Regional Plan of New York and Its Environs began its work. Dealing with a commercial and industrial empire embraced within a circle of 100 miles diameter, this bold undertaking was incomparably more complex than any prior task of metropolitan planning. Fortunately the men who carried out the undertaking did not indulge themselves in idealism but rested their thinking on definite facts of topography, of existing development, and of natural resources and relationships. They built on the sure foundation of fact, and to this is due to the value of what they produced.

One cannot contemplate the outcome of this ambitious adventure in planning without being convinced that it will become the model for all similar studies elsewhere. The past ten years have demonstrated in many ways that we cannot in future hope to develop great centers of human activity in an efficient way without thorough advance study on an engineering basis. Many experiences have shown that unplanned growth is costly, involving wastes too great to be borne. The Regional Plan has brought to light clear evidence of the costliness of unplanned growth. Wherever large community values accumulate, their productiveness depends on the correlation of population with transportation, of human and business needs with community services; and such correlation implies analysis and planning. Further, since it is not possible to foretell whether large centers of population may develop, it is essential that the planning begin at an early stage. As a model of such planning the work of the Regional Plan is immediately important to every community, large or small.

No advance planning can be final, of course, since foresight never yet has proved able to discount the future with precision. The detail of any plan is certain to require revision sooner or later; the broad functional conclusions will endure, but detail of architecture, of business concentration or of civic-government factors has only transitory value. These truths apply also to the ten years' work now concluded. The task is not finally ended. Only the first step has been made—a great and fundamental step, yet only the beginning of study that is destined to have a long future.

A Changed Problem

IT IS now close to three decades since the American people entered upon its adventurous undertaking of watering the arid regions of the West by building great irrigation works. Prior to this time, development of land for the use of private owners was not considered a legitimate field for public effort and expenditure; the decision to embark on the adventure was therefore revolutionary. The intent was to select desert public land suitable for irrigation development, provide it with water by building dams and canals, and then sell the land to settlers on long-term payments without interest. Great changes have come to pass in both the facts and the ideas of federal reclamation, however, and today the situation is wholly new. A thorough reorientation of federal policy seems near at hand.

Two leading aspects of the present-day reclamation problem were brought to the front at Chicago recently in an address to the Association of Land Grant Colleges by Dr. Elwood Mead, commissioner of reclamation. First is the virtual disappearance of undeveloped desert land from the reclamation picture. Second is the increasingly dominant importance of stream conservation by complete capture of floodwaters, as a fundamental of all development possibilities. Both will prove central factors of the coming reorientation of policy.

The first-mentioned factor is of immediate interest, though it is not new. Even in the past reclamation was only rarely concerned with unsettled desert lands; usually a reclamation project grew out of a partly developed area that was inadequately supplied with water and faced bankruptcy. But the need for thus saving existing projects has increased steadily, and as Dr. Mead pointed out in his address it is the controlling or perhaps the sole need for federal reclamation activities today. Such rehabilitation operations, however, depart greatly from those contemplated in 1902, when the Reclamation Act was passed.

A method of financial rehabilitation was before the last Congress and will probably be reintroduced this year. It would set up a revolving fund for purchasing the outstanding bonds of districts or projects that cannot meet their obligations, and refund them at lower interest rate as a debt to the government. While this proposal is of wide concern, not alone because many districts are now embarrassed but also because the plan would extend the government's banking functions, Dr. Mead did not deal with it but discussed instead the physical rehabilitation that many districts need if they are to be saved from ruin: the construction of new canals, storage reservoirs to provide a dependable water supply, and the like. If he is right—and no man is better posted on irrigation conditions than Dr. Mead—the era of reclamation as a creative activity would appear to be over, and future reclamation will be exclusively salvage work. The original principles of the reclamation law are not adapted to this change of function. A new law is in order.

Even more significant was Dr. Mead's emphasis on stream conservation. He believes this to be all-important for the growth of the West. Only in a few special instances are the states or private parties able to plan and build the necessary storage; the benefits of conservation or complete control of a stream usually extend beyond the reach of state or private control, and, further, the coordination of water use without which stream conservation will often remain ineffective cannot be achieved by state or private agencies. Federal power must inevitably play a large part in regulation. How this may be done with justice to all parties is still to be worked out. The Association of Western State Engineers, though it has repeatedly discussed the relation of federal and state responsibilities on streams, has not yet succeeded in devising a plan that promises to be the solution.

Thus, the problem of federal reclamation has changed in its essential nature since 1902. Reclamation is in many respects the government's largest activity outside the purely administrative field; it occupies a notably high place in our engineering arts, and it is a vital factor in the life of more than a dozen states—nearly half of the country's area. Any basic change in the laws under which it operates is of quite immediate bearing on manifold engineering interests, and it follows that the reorientation of policy which the altered conditions require can be influenced constructively by the study and conclusions of engineers. The subject eminently merits their attention as something affecting all the people and therefore to be discussed without bias of local interest.

Chicago's New Diagonal Thoroughfare

Completion of a ¾-mile link costing $5,500,000 will close the last gap in a 12-mile avenue leading to the lakefront

Fig. 1—Ogden Ave. viaduct across Goose Island, Chicago

At the right is the tail pit and reaction girder for bascule bridge over North Branch canal.

FEW DIAGONAL THOROUGHFARES supplement the rectangular street layout of Chicago, but one of these—Ogden Ave.—will soon have its importance greatly increased by a 2¾-mile extension costing some $12,000,000 and completing a 12-mile direct route from the southwest section to the lakefront. This major improvement, which is a part of the Chicago Plan, not only will complete a thoroughfare of commercial value but will give a direct connection between an inland section of the city and the extensive park and beach facilities on the Lake Michigan waterfront, which is one of Chicago's great recreational assets. About 50 per cent of the cost of the extension is required for a ¾-mile stretch of viaduct, now under construction, which includes both steel and reinforced-concrete construction and has two bascule bridges. Among other complications the viaduct design has to provide for a future three-level grade separation project at a busy intersection beneath the structure. With a 78-ft. roadway this thoroughfare will have the great capacity required for a main traffic artery. —EDITOR.

AN INDIAN trail to Fort Dearborn formed the location for the original portion of Ogden Ave., Chicago, this trail extending northeast through what is now the far southwestern corner of the city to the present west end of Randolph St. at Union Park, whence it ran directly east for about 2 miles to reach the fort and settlement at the mouth of the river. When Ogden Ave. was built on this location as one of Chicago's few diagonal thoroughfares, it terminated at Union Square. With the growth of the city in recent years it became desirable to extend the avenue northeast to Lincoln Park on the lakefront, a distance of 2¾ miles, to form a diagonal thoroughfare entirely across the city, with a total length of 11.13 miles. Thus, when completed, it will provide a main traffic artery and a convenient route by which an inland population can reach the lakefront park and recreation facilities. It will improve communication between industrial and industrial-residential districts and will lead to economic development of areas now practically neglected. A part of the long viaduct across Goose Island is shown in Fig. 1.

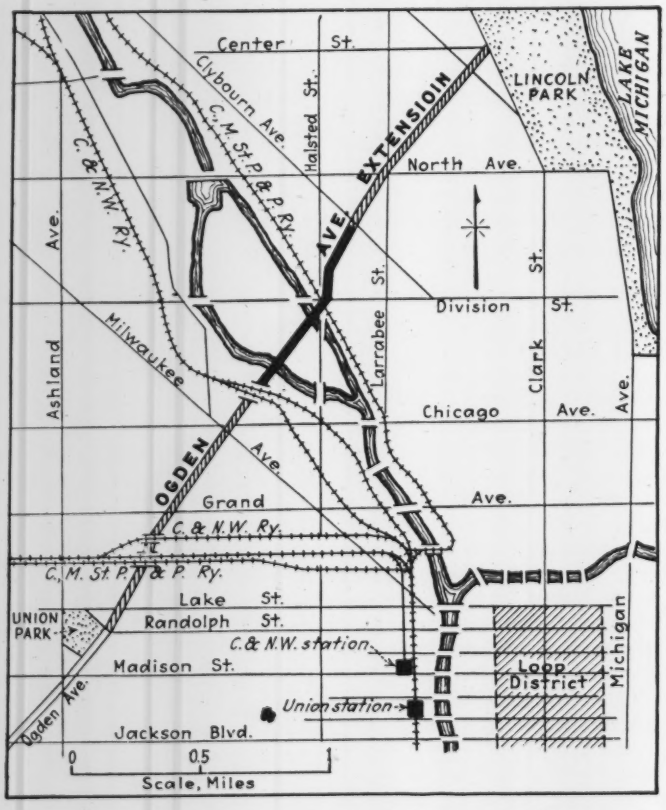

Fig. 2—Ogden Ave. extension to lakefront, Chicago

This extension of Ogden Ave. was recommended in 1916 by the Chicago Plan Commission as one of its major projects, and a city ordinance authorizing the construction was passed in 1919. The project was expensive, since it involved the crossing of two adjacent channels of the Chicago River by bas-

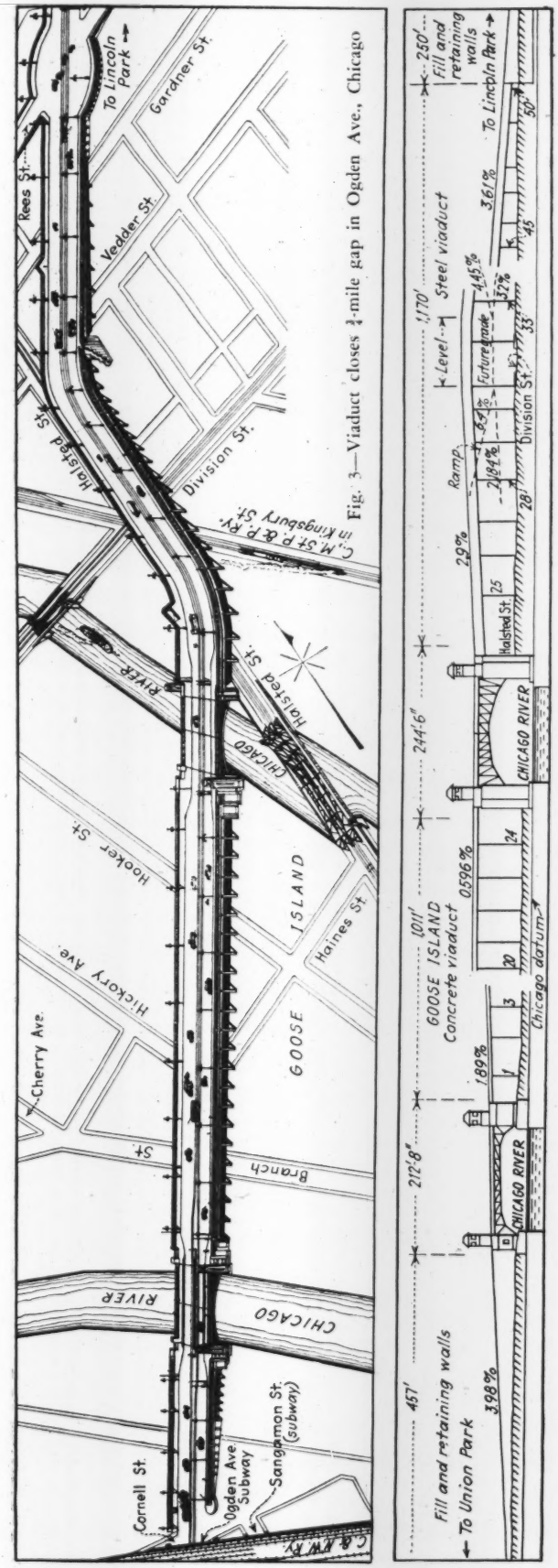

Fig. 3—Viaduct closes ¾-mile gap in Ogden Ave., Chicago

cule bridges with long viaduct approaches. In consequence the work was divided into three sections, the middle and most expensive section (Fig. 3) being left until the last. By 1925 the end sections extending northeast from Union Park to Chicago Ave. and southwest from Lincoln Park to Division St. had been completed (Fig. 2), each section being about a mile in length. In 1930 public vote approved a bond issue of $5,400,000 for the construction of the middle section, about ¾ mile long. Work was begun in February, 1931, and is to be finished during the summer of 1932.

On the Ogden Ave. extension the width is 108 ft. between property lines, with a 78-ft. roadway and two 15-ft. sidewalks, an 18-ft. central strip of the roadway providing for a future street-car line. On the southern section this strip is a parkway outlined by concrete curbs, but on the middle and northern sections the roadway paving extends the full width between sidewalks. On the viaducts the 108-ft. width is continued in view of probable air-right developments alongside of them. At the river bridges the roadway width is reduced, but the traffic capacity is the same, since the 78-ft. width includes parking spaces. The total cost of the extension, from Union Park to Lincoln Park, will be approximately $11,900,000.

This new thoroughfare was cut largely through an industrial district and its tributary industrial-residential districts, where the property in general was of low value, while the buildings removed were mainly old, small and of cheap construction. On the two end sections the work consisted principally in clearing and grading the right-of-way and laying the concrete paving for roadway and sidewalks. Right-of-way was acquired by condemnation.

The Middle Section—For the ¾-mile middle section (Fig. 3) the conditions were quite different. To provide for adequate headroom at two river bridges and the overhead crossing of Division St., it was necessary to raise the grade line considerably, thus involving viaduct approaches and a connecting viaduct across Goose Island. The old curved channel of the North Branch of the Chicago River is on the west, while the direct channel or North Branch Canal is on the east.

This elevated structure has certain advantages. It avoids grade crossings of two railroads having main and industrial tracks with frequent switching movements. It also avoids grade crossings of several streets that cross the line of Ogden Ave. at awkward angles, and some of which carry heavy traffic, including street cars. Through traffic on this section of the new diagonal thoroughfare will be entirely free, therefore, from interference by cross-traffic.

Owing to obstructions and right-of-way conditions it was not possible to make a straight-line location for the 2¾ miles. An offset between the two end sections is taken out by a jog or bend in the viaduct, where it runs parallel with Halsted St., connecting with the other portions by curves of 300-ft. radius. Stairways will lead from the viaduct to some of the cross-streets.

Beginning at Cornell St., at the end of the present Ogden Ave. subway under the Chicago & Northwestern Railway, the extension rises on a grade of 3.96 per cent to the first bridge, this aproach of about 450 ft. consisting of a fill between retaining walls. The bridge has grades of 2 and 1 per cent on the south and north leaves respectively. Thence a reinforced-concrete viaduct of 1,050 ft. extends across Goose Island, rising on grades of 1.89, 0.36 and 0.595 per cent in order to reach an

Fig. 4—Under the concrete viaduct

Note long space between cross-girders, which are used only at expansion joints.

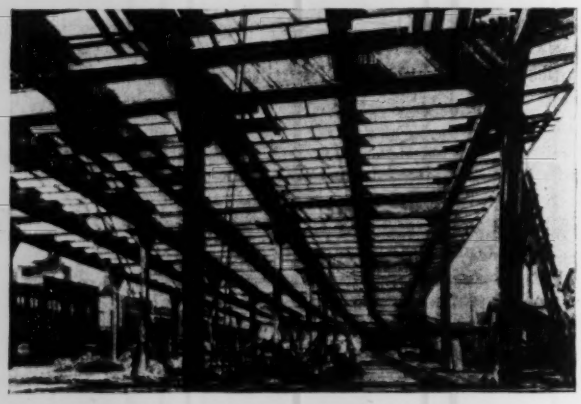

Fig. 5—Framing of steel viaduct

Here the structure parallels Halsted St. Curve of 300-ft. radius at right.

elevation giving sufficient headroom over the Division St. crossing. As a result, the second bridge has ample headroom for the passage of small vessels. Over this bridge the grade is about 0.5 per cent. Beyond it the grade continues to rise at 2 and 2.9 per cent as far as Division St., where a headroom of 31 ft. above the present grade of the street is thus available.

Plans for the future development of Division St. provide for a change of grade that will reduce this headroom to 13 ft. 6 in., as noted later. The grade descends then at 3.6 per cent to meet the completed portion of Ogden Ave. at Rees St. From the second bridge there is about 1,200 ft. of steel viaduct, incased in concrete, followed by 250 ft. of fill and retaining walls. Vertical curves are introduced at grade intersections.

Concrete Viaduct—The viaduct across Goose Island (Fig. 1) has spans of approximately 45 ft., the span lengths being varied to suit the layout of streets, railroad tracks and industrial properties. Four-post bents have the columns supported on concrete piers sunk to rock at about 70 ft. below the ground, or 60 ft. below Chicago city datum. Four lines of longitudinal beams form a rigid frame with the columns, but transverse beams are provided only at the expansion joints, which are approximately 200 ft. apart. This arrangement gives a rather lofty effect to the space beneath the deck, as may be seen from Fig. 4.

In designing the structure the longitudinals were considered as T-beams for unbalanced loading and temperature, the bending moments in the columns being analyzed by a combination of the fixed-point and slope-deflection methods. Column dimensions, however, were governed mainly by architectural considerations. Construction features of this viaduct are given in Fig. 6.

The concrete deck slab, reinforced at top and bottom, is 16 in. thick in the middle panels and is depressed 16½ in. for a width of 18 ft. to form a trough for future street-car tracks. At present this trough is filled with lean concrete, separated from the slab by a two-layer waterproofing membrane and an armor coat of concrete-mortar, which protects the membrane. Vertical drains are provided to carry off any seepage. For the two outer panels the deck slab is 16 to 14 in. thick. Concrete was poured in two longitudinal sections, with a mortise joint on the center line. A 2-in. concrete wearing surface is applied over the entire width of roadway.

Electric wiring will be carried in fiber conduits in the sidewalk slabs, the conduits entering concrete box handholes on the outer columns of alternate bents (Fig. 6). Where the viaduct crosses railroad tracks the concrete beams are protected from blast and gases of locomotives by ½-in. cast-iron plates having a smooth surface and anchored by bent bolts that are cast into the plates and embedded in the concrete.

Future Grade Separation—In planning this improvement and designing the structures a complication was introduced by the necessity of providing for future street changes and grade separation. At present the Chicago, Milwaukee, St. Paul & Pacific Railway crosses at grade the busy intersection of Halsted and Division Sts., both of which have street-car lines, while the Halsted St. bridge over the North Branch Canal is close to the Ogden Ave. extension. In the original design, as laid out by the Chicago Plan Commission, these three streets were to intersect at the same level, and that part of

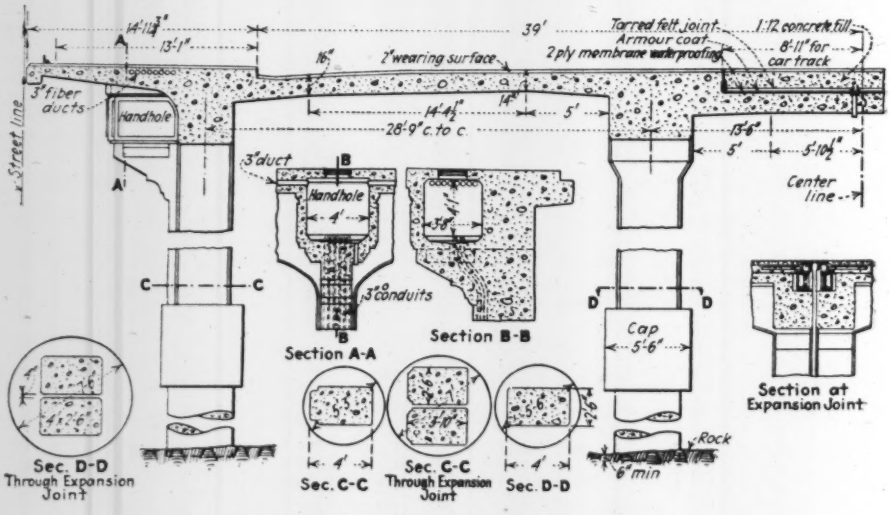

Fig. 6—Details of reinforced-concrete viaduct

Ogden Ave. within the east and west lines of Halsted St. was to be 170 ft. wide. This plan was changed by raising Ogden Ave. above the other streets and reducing the width of the viaduct in Halsted St. to 108 ft. But to insure minimum interference with the heavy traffic on Halsted St., the viaduct was placed on the east side of the street.

The project as adopted provides for a future raising of Halsted and Division Sts. to an elevation that will give a headroom of 13 ft. 6 in. under the Ogden Ave. viaduct, instead of the present 31-ft. headroom. At the same time the railroad tracks along Kingsbury St. will be depressed, thus making a three-level grade separation. As a part of this ultimate plan, the design of the viaduct at this point is so made as to allow for the removal of the central portion of the roadway and the construction of ramps, with grades of 4½ and 6½ per cent, coming down to the north and south sides of Division St. This future condition is indicated by dotted lines on the profile in Fig. 3.

Steel Viaduct — For the north viaduct, steel was adopted on account of the long spans required to take care of existing and future conditions, as outlined above, and also on account of the irregular arrangement of floor framing necessitated by the curves. A curious feature is that for about 654 ft., where the viaduct parallels Halsted St., it partly overhangs the east side of that street. Another special feature is that the structure had to be designed to allow for the future raising and relocation of the Halsted St. bridge and its approaches, while the surface tracks of the Chicago, Milwaukee, St. Paul & Pacific Railway will be depressed to pass under Halsted St. Furthermore, it was necessary to design the viaduct between the canal bridge and Veeder St. so as to obtain a practical traffic scheme in the event that Halsted St. should be widened to 100 ft. at some future time.

In typical construction this viaduct (Figs. 5 and 7) consists of four-post bents with spans of 38 ft. 9 in. to 60 ft. Its column foundations are similar to those of the concrete viaduct. The columns are 12-in. H-sections spaced 26 ft. c. to c. for the middle bay and 29½ ft. for the side bays. Against them are framed transverse plate-girder floor beams and cantilever sidewalk brackets. Seven lines of 54-in. longitudinal girders or stringers are framed between the floor beams, and between these again are transverse 20-in. I-beams at about 8-ft. spacing. Cantilever sidewalk brackets correspond with the I-beams of the roadway. This typical arrangement is varied at the curves, where unsymmetrical spacing of the columns and framing becomes necessary.

In the side bays of the deck framing the transverse I-beams are near the tops of the stringers to support the roadway slab. But in the middle panel they are dropped to carry the bottom slab of the trough in which future car tracks will be laid. Shelf angles on the floor beams support the ends of the trough slab. The deck slab differs somewhat from that of the concrete viaduct, owing to the more frequent support by longitudinal and transverse beams. Thus the roadway slabs have a uniform thickness of 12 in., including a 2-in. wearing surface. At the car-track space, however, the slab is depressed 16¼ in. to form the trough for the tracks, and its thickness is 9 in. This track trough is divided by the central longitudinal girder, which projects up into it, as shown. The sidewalk slab is 6 to 8 in. thick.

All steel beams and girders are wrapped with wire-mesh reinforcement for gunite or concrete incasement. Double bents are used at the expansion joints, which are spaced about 150 ft. apart. In Fig. 7 there will be noted a "future track" 19 ft. 3 in. from center line, and also a "future curb," shown in dotted lines. These indicate the position of the street-car lines when spread to the sides of the roadway to clear the future central ramps.

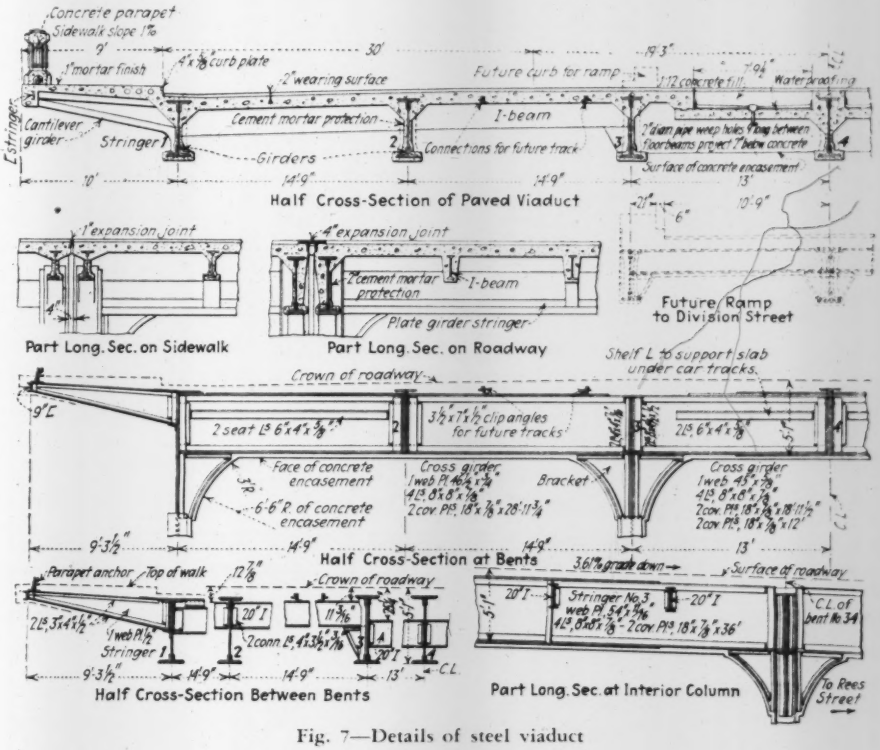

Fig. 7—Details of steel viaduct

Viaduct Loads—The exterior beams, usually referred to as the curb stringers, are designed for two 24-ton trucks (plus 40 per cent impact) trailing and adjacent to the curb, with a uniform load of 100 lb. per sq.ft. (plus 30 per cent impact) over the unoccupied area outside of the truck lane. The interior beams, usually referred to as the roadway stringers, are designed for two 10-ft. lanes of traffic, consisting of two 50-ton street cars (plus 40 per cent impact) trailing in one lane with two 24-ton trucks trailing in the adjacent lane (plus 40 per cent impact), with a uniform load of 100 lb. per sq.ft. (plus 30 per cent impact) over the unoccupied area outside of the street-car and truck lanes. The cantilever sidewalks are designed for a uniform live load of 150 lb. plus 30 per cent for impact, and also a parapet railing weighing 600 lb. per linear foot.

Retaining Walls and Fills—The short solid approaches consist of sand fills between concrete retaining walls and abutments of gravity section on wood piling. These walls are on the street or property lines as a rule, but on part of the south approach they are set back and the elevated sidewalks are carried by reinforced-concrete framing supported on the walls and on concrete columns set in 4 ft. from the street line. The purpose of this arrangement is to provide vaulted sidewalk space at the lower or street level.

Expansion joints ¾ in. wide, spaced at intervals of approximately 44 ft. in the walls, have a joint filling and waterstops of bent zinc plates with their ends embedded in the concrete. On the sand fill, compacted by flooding,

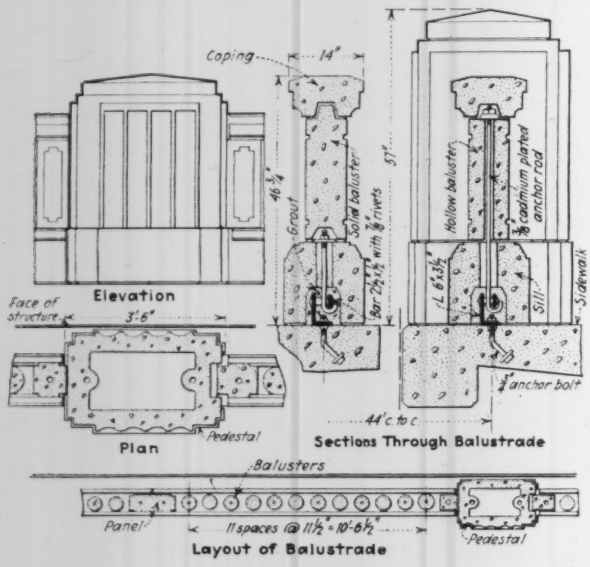

Fig. 8—Details of parapet
Note anchorage construction.

is a concrete paving slab divided into three sections. The 18-ft. central strip, designed for removal when car tracks are laid, is 6 in. thick with a 2-in. wearing surface poured separately. In the 30-ft. side strips the base and top thicknesses are 7 and 3 in., respectively. The sidewalk slab, 13 ft. 2 in. over all, is 5 in. thick, with its top finished to form the wearing surface. At the transverse expansion joints in the roadway slab 1-in. dowels 30 in. long project 15 in. from one side and enter 1⅛-in. steel tubes embedded in the opposite side. The tubes and projecting dowels are coated with heavy oil.

Parapets—For the parapets on the viaducts and fills a balustrade formed of precast units has been designed, comprising a sill, closely spaced balusters and a top rail or coping, the sill and rail being in lengths of about 14 ft. (Fig. 8). Anchored to the sidewalk slab is a continuous steel angle having its upstanding leg punched for studs that secure the looped ends of the balustrade anchors. The sill straddles this angle and is anchored to it at alternate balusters, as shown in Fig. 8. These balusters are cylindrical, with fluted surfaces and circular grooves, the diameter over flutings being 7 in. Alternate balusters are solid, with a pocket at the bottom to fit over the sill anchor and a projection at the top to enter a socket in the cap rail. The others are hollow and receive long anchor bolts, engaging the studs.

With these hollow balusters the nut and washer on top of the bolt enter the socket in the cap rail. Groups of twelve balusters are separated by rectangular panels or slabs. At intervals of 44 ft. c. to c. there are pedestals with expansion joints. The panels and pedestals are anchored in the same way as the balusters. These precast units are made in steel molds to insure a smooth and even finish.

Drawbridges—Both bridges will be of the double-leaf trunnion bascule type commonly adopted for Chicago River bridges, and they have the usual foundations of concrete cylinder piers sunk to rock and supporting concrete boxes, which form the tail pits and abutments. On the moving leaves the roadway paving is to consist of 1½-in. asphalt planks of 8x12-in. creosoted-pine subflooring, while the sidewalks are to have ¾-in. asphalt plank with yellow-pine subfloor. In the deck framing, provision is made for the future street-car tracks.

In structural design the two bridges differ materially. For the bridge over the old (west) channel, in order to provide the war department's required clearance of 21 ft. and still avoid too steep a grade on the short south approach, it was necessary to have a triple-truss arrangement and to extend the trusses to railing height above the deck. This bridge, therefore, with a clear opening of 150 ft., is 182 ft. c. to c. of trunnions and has two roadways 28 ft. 8 in. clear width and two 9-ft. sidewalks, with a width of 90 ft. over all. For the bridge over the straight channel or North Branch Canal the grade necessary to carry the viaduct approaches over the streets at proper elevation brought the bridge at such a height as to give a clearance of 30 ft., which is ample. Here, therefore, a two-truss deck design was adopted, having a 60-ft. roadway and two 12-ft. sidewalks, or a total width of 84 ft. The clear opening is 158 ft., and the span c. to c. of trunnions is 191 ft.

Engineers and Contractors—This project is being built for the city of Chicago under the direction of the bureau of design of the board of local improvements. William A. Mulcahy, engineer of special improvements; Arthur Engh, assistant engineer of special improvements; and Arthur Stauder, construction engineer, are in direct charge of the work. The Great Lakes Dredge & Dock Co. has the general contract, with L. C. Hardwicke as superintendent of construction. The work is to be completed in the summer of 1932 at a cost of about $5,500,000.

New York Municipalities Report Purchases

Hereafter, when a city or first-class village in New York State purchases a quantity of supplies, the purchasing official of every other city and village will, within a month, know the quantity and quality purchased and the unit price paid. This service has been inaugurated by the New York State Conference of Mayors and Other Municipal Officials, which sends to the purchasing official of each city and first-class village a blank form on which is listed about 100 supplies and materials that all municipalities ordinarily purchase in the course of a year. The official reports on this form the quality and quantity of all the listed articles that his municipality purchased during the previous month, and the unit prices paid. He returns the report to the conference not later than the 10th of each month. All data received are compiled, and a confidential report is mailed to each purchasing official not later than the 15th of each month.

Novel Construction of Outfall Sewer With Wood-Stave Pipe

Pipe sections fastened together by stapling on longitudinal wires—Line extended into position as built and sunk

By E. FRENCH CHASE

Sanitary Engineer, Department of Streets and Sewers, Seattle, Wash.

THE BUILDING of submerged sewer outfalls of wood-stave pipe sections by simple field operations has proved a successful development on several installations at Seattle, Wash. The method of connecting the sections, which is believed to be unique for such construction, consists of stapling continuous longitudinal wires along the pipe. As the line is thus fabricated at the edge of the water it is progressively floated out into position and later sunk. This type of construction has proved to have several advantages, including elimination of subsurface work, suitability for conforming to an uneven bottom and lack of skilled labor required. One of these lines has been in operation for two years without giving any trouble, and since the construction of that first sewer seven outfalls have been built in the same manner.

The first installation of this type resulted from the need for repairing a wood-box submerged outfall sewer discharging into the Lake Washington Canal at the foot of 24th Ave. N. W. This line broke about 100 ft. from shore at a depth of about 12 ft., and a sludge bed began to form, creating a very objectionable condition. Plans were made and funds appropriated for constructing a new sewer line supported on the piles of a near-by city wharf. However, the harbor department objected to the discharging of sewage at the end of the wharf, and work was stopped while a substitute plan was developed, which was necessarily restricted in cost by the amount of money already appropriated. Adjacent to the wharf was a wood-stave pipe plant, and this suggested to the writer the possibility of using this material for the new line.

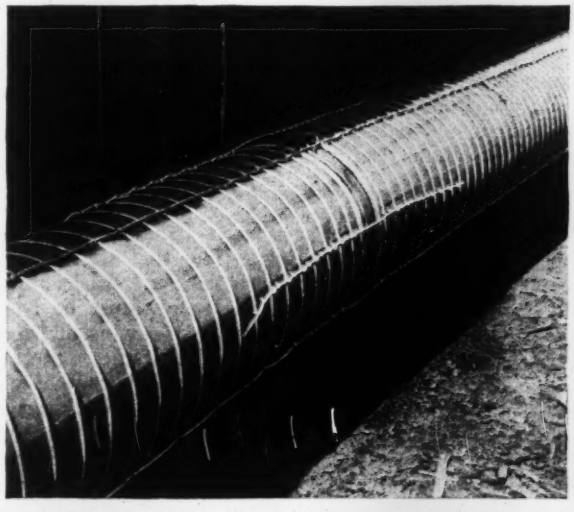

Fig. 1—Four continuous longitudinal wires are stapled to pipe sections, and four additional splice wires are used across the joint of Seattle outfall sewer

Creosoted wood-stave pipe, 18 in. in diameter and designed for a 50-ft. head, was selected for the line. These pipe sections equipped with collars were fabricated into the continuous line on a 4x36-ft. platform built on the ground at the edge of the water. The process consisted of fitting the pipes together and stapling on four longitudinal No. 2-gage special winding wires having an ultimate breaking strength of 3,250 lb. per wire. These wires were equally spaced around the pipe and stapled every 4 in., being continuous along the assembled pipe line. Across the joints of the individual pipe sections four additional wires were stapled, dividing the spaces between the four continuous wires. The type of construction is clearly shown in Fig. 1.

Short lengths of iron pipe were used as rollers, and the completed line was pushed ahead and floated on the water as fabricated. This operation continued until 840 ft. of line had been built, when the last six lengths were placed in a trench and connected to the sewer line at the last manhole. A diagonal weir was constructed in the manhole, so that when the 18-in. wood-stave line reaches capacity the excess discharge flows over the weir and into the box sewer as a storm overflow.

Fig. 2—Constructing small-size wood-stave outfall line by joining sections together with continuous longitudinal wires

The outer end of the floating pipe was tied to a raft and was fastened at various intervals by ropes to the adjacent wharf to keep it from drifting out of line. Cement sacks filled with a dry lean concrete were fastened together with wires to form stirrups for weighting the pipe down. These weights were placed across the pipe from rafts, the wire loops being stapled to the line. The depth of water at the outer end of the line was 40 ft., and the flexibility provided by the type of joint permitted the pipe to lie on the uneven bottom of the canal and in some cases to bridge low spots.

The cost of labor and material for this outfall line was $1,568, or $1.87 per linear foot. It has been in operation for two years without giving any trouble, and

since the construction of this first line, seven similar outfalls have been constructed by the city—one into the canal, one into Puget Sound and five into Lake Washington. One of those in the lake was sunk to a depth of 45 ft. at its outer end without difficulty. Further, it has been discovered that it is unnecessary to assemble the pipe at the location to be used, as it can readily be towed into position. This method of wiring wood-stave pipe together also has been made use of for sewer sections or drains that cross or extend around unstable land, such as slides, and also over steep banks where the upper end can be properly anchored.

The work has been done under the direction of the writer. H. W. Dail is superintendent of streets and sewers. The Federal Pipe & Tank Co. furnished the pipe for the installations.

Fundamentals or Specialization?

Engineering education, as a basic factor in the advancement of the profession, must rest on fundamentals—What cooperation of college and technical society can accomplish

By DEXTER S. KIMBALL
Dean, College of Engineering, Cornell University, Ithaca, N. Y.

WHEN the advancement of the profession is discussed by engineers, criticism of the engineering college is often voiced. The old graduate calls for better engineering education, usually in the form of specialized training in this or that branch of practice. Is he right? Dean Kimball, brilliant thinker as well as seasoned teacher, looks at the profession's problems and analyzes its educational needs. His finding is strongly for the fundamentals and against specialization. Let us add cultural studies to liberalize, but only in the later years of the course. —EDITOR.

DISCUSSIONS of registration and licensing of engineers among the active minds of the engineering profession have thrown into high light two interrelated questions: (1) eligibility for membership in professional engineering societies; and (2) technical college courses, from whose graduates the engineering profession is so largely recruited. There is reason for believing that no satisfactory solution of the licensing problem will be found that does not envisage also the related factor of college training, since engineering is no longer an empirical calling but a scientific profession.

Few topics have been so fully and freely discussed in this country as our general educational problem, and technical education has enjoyed its full share of this debate. On two occasions the entire structure of technical education has been fully investigated; the voluminous report of the last great investigation, that conducted by the Society for the Promotion of Engineering Education, is one of the most searching documents ever completed. Yet when one sits in the councils of practicing engineers who are discussing education in its relation to licensing, a surprising lack of information as to the possibilities and limitations of educational processes is evident. But it should be remembered that Plato many years ago remarked that while an artisan resents strongly any criticism of his work by one not a member of his calling, he himself always speaks as an oracle on matters pertaining to government. Human nature has not changed; even today the man in the street speaks as an oracle on politics and education.

The principal cause for this confusion of thinking lies, no doubt, in the very great ramification of engineering method during the last 30 years. Engineering once was a fairly well-defined field, and the terms civil engineer, mechanical engineer, electrical engineer and mining engineer were quite self-explanatory. Today the first three of these at least have been so ramified and the work of engineers in general extended into so many fields as to make the term *engineer* almost meaningless. It is regrettable that this is so, for naturally the term has lost some of the high significance that it should connote. In some of those widely extended fields that have been glorified undeservingly by the name of engineering, occupied often by graduate engineers, the engineering content is so thin as to be hardly recognizable. Naturally these new developments are sure eventually to present problems in matters such as licensing and membership in professional societies.

They have already put much pressure upon educational institutions through the efforts of manufacturers, alumni and others to have special courses organized in the colleges that will prepare men more specifically for the work they think they are going to do after graduation. The number and character of these proposed additions to the curriculum are many and varied. Every manufacturer and every alumnus views the college through the spectacles of his own peculiar experiences. If a man has made a success in manufacturing chewing gum, he naturally proclaims, "Go to, let us have courses in the production, transportation and sale of this important commodity." It is difficult sometimes for college faculties to resist this pressure, charged as they often are with being backward and out of touch with progress, and to select those developments that show hope of being permanent and helpful additions to the curriculum and in line with industrial progress.

What the Teacher Knows

The considerations that govern faculties in accepting or rejecting the many suggestions that are advanced to them should be noted, for they are basic. Any engineering work worthy of the name must be based upon mathematics, physics, chemistry, drawing and their derivatives, such as mechanics, hydraulics, thermodynamics and surveying. No group of educational subjects has been so fully and so critically discussed by educators and practicing engineers. And when the large number of engineering schools in this country is considered, it is surprising how closely their faculties agree as to the character and minimum amount of these basic studies that must necessarily constitute the central core of all engineering education.

Not only does this central core of studies present the fundamental facts of engineering practice, but no other related group of studies has been found that is so effective in training the student's mind in those habits of thought that are peculiar to the engineer. In engineering colleges of good grade approximately three-fourths of a four-year curriculum is absorbed by this central core, leaving about one year for engineering applications and general subjects, such as English and economics. Usually it almost fills the first two years and then tapers off to the end of the fourth year, leaving room for an expanding wedge of engineering applications and general studies in the last two years. Mechanical, electrical and civil engineering and the various special courses that they embrace differ largely from one another only in the different accent given to the derivatives of the fundamental subjects and the engineering applications of the junior and senior year. Thus, mechanical engineering emphasizes mechanics and thermodynamics, while electrical engineering lays more stress on the derivatives of physics.

"Any intelligent appraisal of engineering education must be based upon the depth and solidity of the basic studies and not upon the specialty studied or the degree conferred."

The majority of faculties have answered the demand for closer specialization by holding this central core firmly, but permitting so-called "senior options," that start their special roots not earlier than the second year, and filling in the expanding wedge formed by the central core. A few faculties only have permitted specialization to begin in the freshman year, displacing to some degree the fundamentals noted in the foregoing. By these means it has been possible to train men fairly well in the fundamentals of engineering and to give them a little idea of the special field in which they have elected to work. This makes it possible also to add new fields of special study or to drop outworn specialties without serious change in the body of the curriculum.

Any intelligent appraisal of engineering education for purposes of licensing or membership in professional societies must be based upon the depth and solidity of the basic studies and not upon the specialty studied or the degree conferred. In mechanical engineering, for instance, the quality of the course in mechanics of engineering and the point in the curriculum in which it is given is a fair index of the value of the course. The degree conferred is no index of this value.

This educational plan makes possible also the construction of strong courses in what is usually termed industrial or administrative engineering, in answer to the demand for more specific training in economics and industrial management for the 75 per cent of the engineering graduates who eventually find their place in the administrative side of industry. The expanding wedge provides room for sequential courses in these fields, at the same time giving the student a good grounding in engineering. Courses of this kind are proving popular not only with students but also with industrialists who employ college graduates. There is, perhaps, no better training for the administrative side of the industrial field than a good grounding in engineering, supplemented by economics, accounting, finance and management.

No four-year engineering course has been devised, however, that answers fully the criticism that engineers are narrowly trained, nor the demand that the engineering courses be liberalized by the addition of such courses in liberal arts as will help the graduate engineer to meet men of culture on even terms. Of course, any engineer who wishes can become a cultivated man through independent reading and reflection, but no doubt this process is greatly accelerated by elementary training in college. It is not possible to include even a moderate amount of so-called liberal studies in the four-year course. The pressure due to the natural growth of engineering fundamentals has compressed the central core to a minimum, leaving room for only such courses as a little English, economics and kindred subjects. Economics and its derivatives, however, have become a necessary part of the working equipment of most engineers, and no room is available for history, psychology, philosophy, literature or art appreciation, that would be truly liberalizing to the engineering student. If these are to be included in his education, the college course must be lengthened to at least five years. By similar reasoning the course must be lengthened if the engineering fundamentals are to be increased.

Two Opposite Plans

While many engineers and educators are convinced that a longer college course would be desirable, there is a marked division of opinion as to the manner in which it should be accomplished. On the one hand is a group of educators and university administrators who believe that *all* university students should be required to take one or two years in a college of arts, so called, on the ground, presumably, that there is certain fundamental information that all students should have before going into anything savoring of practical work. On the other hand there stands a group composed largely of engineering educators who insist that the student should come directly into the school of engineering and that the liberalizing studies should be given to him during the latter part of a course substantially as outlined in the foregoing, but lengthened to five years.

The difficulties in the first plan are many. In the first place, there is no body of knowledge that is universally applicable to all students, and, with the exception possibly of history, nothing but the most elementary courses in economics, psychology, literature, etc., can be placed before freshman students. Language is not in itself liberalizing but is rather an accomplishment. An examination of the curriculum of the universities where such a plan is in operation will disclose that these preliminary or vestibule years are either filled with the necessary mathematics, physics, etc., that are absolutely necessary to any reputable four-year course in engineering, or they are diluted with foreign language, elementary English and very elementary economics.

"If a man has made a success in manufacturing chewing gum, he naturally proclaims, 'Go to, let us have courses in the production, transportation and sale of this important commodity.'"

President W. E. Wickenden, of Case School of Applied Science, who directed the survey made by the Society for the Promotion of Engineering Education a few years ago, writes thus of this plan:

> The actual results of a divided program in which some other type of college is made to serve as a vestibule to engineering

have been seriously disappointing. It appears that the spark of enthusiasm for engineering is quenched more often than it is kindled and that students are more often diverted through prejudicial influences than directed to engineering through constructive guidance. The result appears in the marked shrinkage of enrollments and graduations in engineering colleges that have introduced strictly professional programs with admission based on two or more years of academic work. Actual gains in the quality of the final product appear to be due chiefly to the greater length than the divided character of the program when comparison is made with men who have spent an equal period in undergraduate and postgraduate work in engineering colleges.

Elsewhere President Wickenden points out that the conditions that dictated the present plan of education in law and medicine have no parallel in engineering.

Many engineering educators, therefore, favor the second plan, where the freshman is brought directly into the college of engineering, his enthusiasm and interest kept alive and growing by a study of the basis of his life's work, and a solid foundation laid for engineering instruction. Liberalizing subjects begin in the early years and expand in quality and quantity as the wedge of non-engineering subjects expands toward the end of the course. In a five-year course this provides for sequential courses much better than in any vestibule plan, and the liberal studies come later in the course, when the student is more mature, more thoughtful and more efficient. Experiments with this plan so far have been very encouraging.

Professional Standards and the Society

There remain the relations between industry, the professional societies and engineering education. Any discussion of the relations that exist, or should exist, between industry and education, bearing upon the placement of graduates, is far beyond the limits of this article. But it should be noted that these relations have been greatly clarified during the last ten years. The establishment of personnel departments in industrial plants and the inauguration of personnel and placement bureaus in colleges have made possible a helpful interchange of ideas. The possibilities and limitations of educational processes and the proper and most economical procedure on the part of those who employ graduates are much more fully understood than formerly, and the future of these relations is very hopeful.

"If the engineering schools are all wrong, American industry also is all wrong, for it is for the most part the result of the labors of college-trained men."

The relation between education and the professional societies, however, is still an important and a live problem. Engineering education in this country, while growing naturally out of the needs of professional work, has been by no means the work of practicing engineers. Again quoting President Wickenden:

> It has been nurtured by professional educators rather than practitioners, and in its turn has been a parent rather than an offspring of the organized engineering profession.

Educators have always been prominent in the affairs of the professional societies. The American Society of Mechanical Engineers, for instance, came into being largely at the suggestion of college professors, and its first president was the director of a college of engineering. The engineering college, furthermore, has grown up either in institutions with private endowment or in the land-grant colleges, supported by state and federal funds. Their development has been unhampered for the most part by outside influences. The engineering profession in this country owes much to the influence of the colleges.

It has been only in recent years that the professional societies have turned their attention to education, and the reason for this is the common problem of elevating the standards of the profession. Here is no doubt a problem where effective cooperative work may be done.

Limits of Registration

Professional organizations turn naturally to registration and licensing as a cure-all for low standards in their ranks. While no doubt licensing can accomplish something, its possibilities are often overestimated. The only sound reason that can be advanced for licensing is protection of the public, and licensing will be successful only in proportion to the urgency of this need. Nothing that savors of trade unionism is likely to succeed in securing public favor in this regard.

The medical profession, through the American Medical Association, has done much to raise the level of the medical schools and the quality of medical licensing; but in spite of the most urgent need for protection of the public, many quacks and pseudo-physicians still flourish. The bar associations have also exerted a good influence upon law schools and state bar examinations, but these have succeeded even less than the medical association in eliminating undesirables from the profession. Engineering, with its wide fringe of membership shading off into handicraft, will have a difficult task indeed to achieve even what law has accomplished, and cannot hope probably to equal medical regulation.

Aside, however, from anything engineering societies and colleges may do in the way of enforcing registration, much can be done cooperatively to raise the general level. Higher entrance and graduation standards upon the part of the schools and more rigid educational requirements for membership on the part of the societies would help. Indeed, if the societies aspire to have membership accepted as a warrant of eligibility for registration, as is occasionally proposed, the educational requirements of all of the societies must be greatly strengthened. A cooperative effort between the national societies and the Society for the Promotion of Engineering Education, as proposed by Dr. Wickenden, might do much to promote a better understanding of these mutual problems.

In approaching any such cooperative effort, however, the practicing engineer must get out of his mind the common idea that engineering education is all wrong. Naturally there are many weaknesses in education of all kinds, and no one is more aware of this than educators themselves. But the assumption that the practical man is the one who can tell the schools what to do is the idea that is all wrong. Experiences of bringing practical men without teaching experience into educational life have shown them generally to be ludicrously uninformed and inefficient. The engineering teaching profession on the other hand is filled with men who have had experience both in teaching and in practice and who keep up a well-informed contact with the industrial field.

No better proof of the general soundness of American engineering education is needed than the tremendous development of our engineering and manufacturing equipment. If the engineering schools are all wrong, American industry also is all wrong, for it is for the most part the result of the labors of college-trained men.

New Texas & Pacific Terminals at Fort Worth

Passenger and freight stations combined with office building and warehouse—Grade separation includes track elevation and depression, with street subways and viaducts—Extensive street alterations and widenings—Plans developed by railway and city authorities

EXTENSIVE PASSENGER and freight terminal developments on the Texas & Pacific Railway at Fort Worth, Tex., have followed the removal of the old main freight yard and engine terminal from within the city to a location 3 miles west. This establishment of new outlying facilities, described in *Engineering News-Record* of Jan. 10, 1929, p. 63, was due to the inconvenient combination of a great increase in traffic, the impossibility of enlarging the old yard and the hampering of both railway and street traffic by grade crossings on the main line and the yard connections.

With the removal of the old facilities there was released a large site that could be utilized for new city passenger and freight terminals and for industrial development adjacent to the railroad. A revised and improved profile and the elimination of grade crossings in a busy section of the city are important features of the improvement work. The passenger station is owned by the Texas & Pacific but it is a union station, used also, under lease, by the Fort Worth & Denver City, the Missouri - Kansas - Texas and the International & Great Northern (a subsidiary of the Missouri Pacific) as tenant lines. Present traffic averages twenty-three trains daily, of which sixteen are through trains continuing beyond Fort Worth.

Fig. 1—Freight station and warehouse, Texas & Pacific Railway, Fort Worth, Tex.

The new terminal facilities, occupying a space approximately 5,000 x 1,000 ft. between Boaz and Henderson Sts. (Fig. 2), include: (1) a combined passenger station and twelve-story office building, with two-story annex for baggage, express and commissary service; (2) a combined inbound freight house and eight-story warehouse; and (3) a one-story outbound freight house. Through the passenger station there will be a loading track for baggage, express and mail; six passenger tracks, with provision for two more, and two freight tracks. Short stub tracks ending at the station platform will serve for storing private or Pullman cars.

Opposite the freight station is a coach yard with six stub tracks and provision for light repairs, car cleaning and the servicing of sleeping and dining cars. Near the west end of the site is a five-track team yard and a pair of automobile-loading platforms with a track between them. East of Boaz St. is a local or interchange freight yard, in connection with several railroads that cross the Texas & Pacific at this point. Space along the north and south sides of the railway property is planned for industry sites, with track service. Property nearly adjacent to the west side of the passenger station was acquired by the federal government as a site for a post office, and this building is now in the process of construction.

Grade Separation—The Texas & Pacific Railway passes east and west through the heart of the city on a wide right-of-way and practically separates the business section on the north from the residence section on the south. Also the tracks were crossed at grade by several streets carrying heavy traffic, and in order to eliminate these crossings the railway has revised its profile. On account of topographical conditions this revision includes both depression and elevation of tracks, with a maximum raise of about 8 ft. and a maximum depression of about 16 ft.

Track depression, which is west of the station, consists generally of a cut, largely in rock, with three-track roadbed. This work also necessitates an adjustment of the grade of the Fort Worth & Rio Grande Railway (a subsidiary of the St. Louis-San Francisco), which

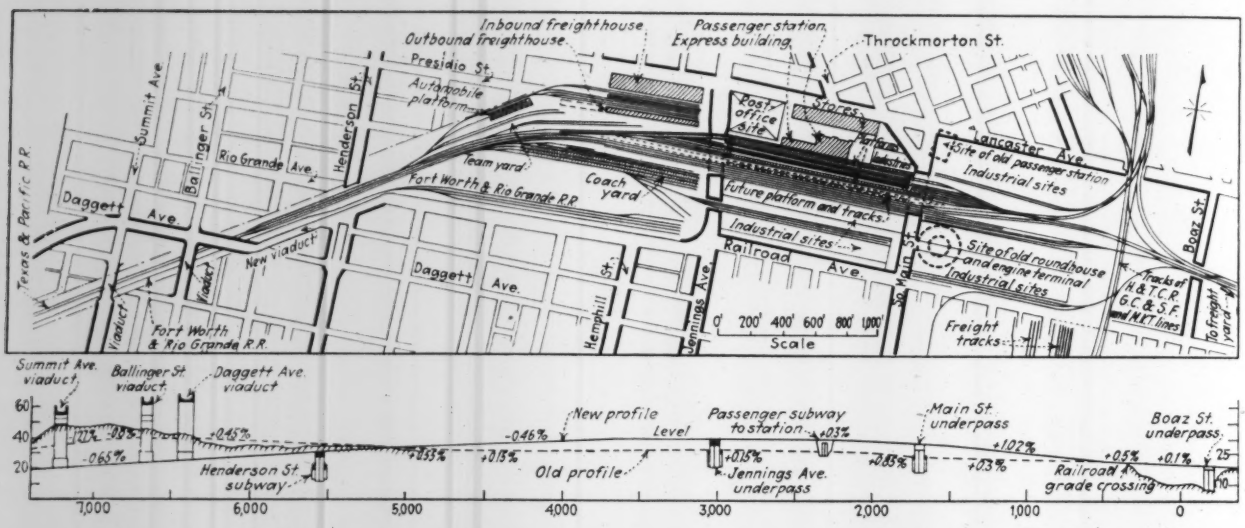

Fig. 2—Railway terminals and street improvements, Fort Worth, Tex.

parallels the Texas & Pacific for approximately 2,500 ft. As the former road is at a higher elevation than the latter, a concrete retaining wall will be built to support the roadbed of the Fort Worth & Rio Grande.

Track elevation, which extends through the station and eastward, consists of solid fill with concrete retaining walls at points where space limitations make them necessary.

Fortunately, these changes resulted in an improved profile, as will be seen by Fig. 2, while the maximum grade is now 1.02 per cent, as compared with 1.27 per cent on the old line. Incidentally, the change was a favorable condition for the new passenger station, as it enabled the waiting room and principal station facilities to be arranged at the street level, connecting with a subway or underpass from which stairways lead up to the the train platforms.

Bridges, Subways and Streets—Of the five grade crossings eliminated, three have the streets carried under the tracks and two streets are carried over the tracks. One overhead crossing is to be replaced by a similar structure accommodating the change of grade, while another will be replaced by a subway. Where the tracks are depressed along the west end of the improvement, street viaducts will replace an old viaduct at Summit Ave. and a grade crossing at Ballinger St. The new Summit Ave. viaduct will have a 56-ft. roadway and two sidewalks. A former grade crossing on Rio Grande Ave. practically intersected the crossing at Henderson St. In eliminating this combined crossing a diagonal viaduct will connect Rio Grande Ave. with Daggett St., while Henderson St. is carried under the railroad by an underpass that provides for six traffic lanes. The viaducts for Summit Ave., Daggett and Ballinger Sts., are to be concrete structures, but with the center or track spans of steel girders cased with gunite.

Underpasses providing six traffic lanes will replace an old street viaduct at Jennings Ave. and a grade crossing at South Main St. Throckmorton St., on the north, is to be widened and extended to the station. What is shown as Lancaster Ave. was part of the railway yards, now developed as a 56-ft. thoroughfare connecting all intersecting streets from South Main St. to Lamar St., which were formerly dead-end streets. Long subways are built in separate sections for different groups of tracks, thus reducing the cost and giving better light and ventilation. Sidewalks are kept above the roadway level in the subways, with consequently easier approach grades, as shown by the view of the Jennings Ave. subway, Fig. 3.

In connection with the new street subways and viaducts, there has been extensive widening of streets parallel with and approaching the railroad, thus materially improving street traffic facilities, as well as access to the station. There has been little trouble encountered in the construction work due to interference with public utilities. An 18-in. water main was relaid with 30-in. pipe, a 15-in. sanitary sewer was changed, and it was necessary to construct a storm sewer in tunnel through rock for 5,359 ft. in order to drain the underpasses at South Main St. and Jennings Ave.

Passenger Terminal—While the old station had stub tracks and a headhouse fronting west on Main St., the new station has long through tracks, with a building on the north side and fronting north on a plaza that is provided south of Lancaster Ave. This plaza provides ample space for the handling and parking of automobiles, taxicabs and buses, clear of interference with street traffic. Along the south side of the station is a concourse 58 ft. wide, from which opens a subway extending under the tracks and having stairways to the train platforms above. West of the concourse is the two-story baggage and express building with its floors at street and track level. At this upper level is a trucking platform that extends the full length of the station, but has no stairway connection with the passenger subway. Beneath this upper level are located the telegraph and telephone offices, taxicab office, parcel checking room and drugstore.

One through track or loading track extends alongside this trucking platform. Then come six tracks with three island platforms, two of these being 1,228 ft. long and the third 1,600 ft. Space is provided for another platform and pair of tracks. Beyond these are two main freight tracks. Shelter roofs with single lines of columns cover the passenger platforms, while a canopy roof shelters the trucking platform. This latter platform and its loading track extend in front of the post office to

provide for handling mail, the space beneath being utilized for automobile parking and storage.

The main station and office building (Fig. 4) is 70x222 ft., with twelve stories, basement and mezzanine floor. It has steel framing up to the third floor, above which it is of reinforced-concrete construction. Light buff brick is used for the exterior, with trim of marble and terra cotta. In the basement are storerooms and the electrical and heating equipment, the latter also serving cars parked on the station tracks. On the first or main floor are the waiting rooms, ticket office, rest and smoking rooms, restaurant and kitchen, together with an independent lobby for the elevators serving the office floors.

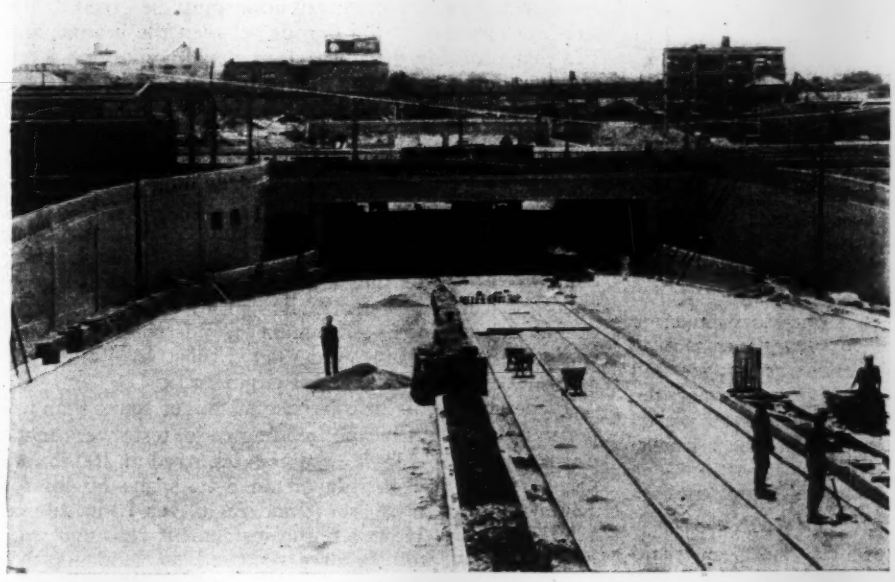

Fig. 3—Jennings Ave. Subway.
Sidewalks kept higher than roadway. Street-car landings in foreground. Platform shelters under construction. Three-span subway beyond serves group of industry tracks.

A mezzanine floor accommodates toilet facilities for white men and also the supply rooms. Separate station facilities are provided for whites and colored people. The second floor has railway offices at each end only, as the ceiling of the waiting room is at the level of the third floor, which latter is occupied by the division offices of the Texas & Pacific Railway. The other nine floors will be rented for general business offices.

Of five passenger elevators, four operate between the first and twelfth floors (143 ft.) and one from the basement to the twelfth floor (155 ft.). They are of 3,000-lb. capacity each and have a speed of 700 ft. per minute. Automatic signaling, floor leveling and door-operating equipment is provided, while to insure efficient service there is an automatic scheduling system for dispatching the cars. A 4,000-lb. freight elevator, with car about 6¼x7 ft., travels from the basement to top floor and has a speed of 300 ft. per minute. Other equipment includes a water-cooling and circulating system, serving all floors, and a watchman's police and fire-alarm system.

Feight Terminals—The inbound freighthouse and warehouse (eight stories and basement) is 100x611 ft., of reinforced-concrete construction, with brick and stone facing. Its north front is 25 ft. south of the south street line, thus providing ample tailboard space and keeping wagons and trucks clear of the street. On its south or rear side is a trucking platform to serve the inbound tracks. In the basement are the refrigerating plant, heating apparatus and storage space. Freight is handled on the first floor, the tracks being at street level. A pneumatic-tube system provides for handling papers to and from the freight office on this floor.

On each of the upper floors, which are leased for warehouse purposes, there is a space 100x520 ft. for dry storage, subdivided to meet the requirements of occupants, while at the west end is a space 100x90 ft. for cold storage. This latter space provides cooling rooms on the second to fifth floors, freezing rooms on the two top floors and either cooling or freezing service on the sixth floor. The minimum temperatures are 30 deg. F. for the cooling rooms and 7 deg. below zero for the freezing rooms. Refrigeration is effected by a brine circulating system. An air-conditioning plant maintains any desired degree of temperature and humidity in each room, disperses odors and carbon dioxide, and supplies fresh conditioned air in required quantities. Insulation is of the envelope system, laid in the second floor and extending up through the walls to and through the roof, supplemented by floor insulation in the sixth and seventh floors.

Besides seven stairways in fireproof towers, there are eleven freight elevators and one passenger elevator.

Fig. 4—Fort Worth passenger station and office building, Texas & Pacific Railway

This last, with car 6x5 ft., is of 3,000-lb. capacity and travels from basement to penthouse (102 ft.) at 500 ft. per minute. No operator is required, the movement being controlled automatically by push-buttons in the car and on the landings. The 10,000-lb. freight elevators, 9x16 ft., travel from the basement to the eighth floor (91 ft.) at a speed of 300 ft. per minute. They are equipped with car-switch control, each car having a master switch. All these elevators are of the gearless, variable-voltage, automatic-leveling type, with electrically operated doors.

Fire-protection equipment includes a dry-pipe pre-action sprinkler system with temperature-actuated devices for detecting conflagrations. The water supplying the sprinkler heads is automatically released by these devices through deluge pre-action valves, provided with remote-control attachments. Electric alarm gongs are located at these valves and in the machine room at an annunciator, showing which valve has tripped and the location of its floor section. In case of fire this indication is given before the sprinkler heads begin to function, making it possible, through the pre-action feature, for the attendant to reach the scene of the fire and extinguish it, if a small one, before there is a chance for water damage by the opening of the sprinkler heads. An automatic fire pump of 1,000 g.p.m. provides an abundant supply of water.

The outbound freight house is a one-story concrete building 40x600 ft., with space for lengthening it to 900 ft. It has an 8-ft. platform on the track side and is served by four tracks. Trucking is done through the cars and on a trucking platform 20 ft. wide placed between the groups of inbound and outbound tracks. The team yard driveways will be paved.

Engineers and Builders

For a period of several years the city has been working with the railway company in order to develop a plan of improvement that would be mutually satisfactory and would provide for eliminating the grade crossings, since the interruption of and interference with public traffic became more serious with the rapid development of automobile and truck traffic. About three years ago the railway company submitted a plan of its proposed improvements, and the city plan board submitted its plan of street improvements. After some revision a combined plan was agreed upon, and the city voted $2,000,000 toward the construction of the street work and underpasses.

All work for the terminal layout and grade separation has been planned and executed under the direction of E. F. Mitchell, chief engineer of the Texas & Pacific Railway. L. W. Hoelscher is resident engineer; Bartholomew & Associates, engineers for the city plan board; and J. L. Lewis, city engineer. Architectural designs were made by Wyatt C. Hedrick, Inc., Fort Worth, which firm also supervised the construction of the buildings. The general contractors were P. O'B. Montgomery, Dallas, Tex., for the passenger station and office building, and the Bellows-Maclay Construction Co., also of Dallas, for the freight houses and warehouse. Elevator installations were made by the American Elevator & Machine Co., Louisville, Ky.

The passenger station, freight station and warehouse are now in service, and it is planned to have all the work, including track revision and grade separation, finished by July, 1932.

Tests of Flat-Arch Tile Floors Produce New Design Data

Advantages of concrete cover and large tierods indicated—Failures generally in skewback tiles

THAT strengthening of skewback tiles in flat-arch hollow-tile floor construction is desirable, since failures of test panels were due in general to a crushing or shearing of the skewbacks, is the principal conclusion based on a series of tests in Chicago. Two other conclusions are: (1) that attention must be given to the size and location of the tierods between the beams; and (2) that probably the tile arch in combination with a top fill that bonds with the tile will show considerable increase in load-carrying capacity as compared with the bare arch. Owing to financial limitations the tests were stopped before the program had been carried far enough to give results that would warrant definite recommendations. These tests, reported in the *Journal* of the Western Society of Engineers, October, 1931, were conducted by the Robert W. Hunt Co. for an engineering committee representing a group of tile manufacturers and consisting of Frank E. Brown, of Smith & Brown, consulting engineers; Magnus Gunderson, structural engineer for Graham, Anderson, Probst & White; and Frank A. Randall, structural engineer.

To determine the possible use of longer spans than are permitted by the Chicago building code, tests were made on spans of 6 to 13½ ft. Failures occurred at 100 lb. per square foot for 8-in. tile on an 8-ft. span; 50 lb. for 12-in. tile on a 12-ft. span; and 78 lb. for 10-in. tile on a 13½-ft. span. However, the instrument readings were unsatisfactory, and failures occurred so suddenly that it was difficult to decide where failure started. As a rule, the skewback tiles were broken, while the key or center blocks were intact. The results did not justify any recommendation.

In the next tests the spans were 4 to 7 ft., and heavier tierods were used as a result of experience with the previous tests. These rods were ⅞ and 1¼ in. for interior and exterior panels, respectively, and were placed 1¾ in. instead of 3 in. from the bottom of the beams. Panels of 12- and 10-in. tile on spans of 8 ft. and 6 ft. 8 in. carried 250-lb. loads for several hours, with deflections of 0.48 to 0.72 in. for the former and 0.51 to 0.75 in. for the latter. Failures occurred with loads of 350 and 430 lb., respectively. With 8-in. tile on 5½-ft. spans, 350 lb. was carried without failure. It is considered probable the crushing or shearing of the skewback tiles was the cause of failure.

A 2¼-in. concrete top fill with 1-in. cement finish was used over 7-ft. spans of 8-in. tile, and here the skewbacks failed under loading equivalent to 950 lb. uniform load and 475 lb. shear. Similar panels without this top covering failed at 425 lb. uniform load.

Failure of the skewback tiles was believed to be due to the fact that they did not fit the wide-flanged I-beams used for the steel frame. A new design of skewback tile was tried, having its lateral members in such a position that the thrust would enter normal to the inclined face, but the report states that failure at 340 lb. was about the same as for similar arches that had ordinary skewback tile.

Timed Public Works a Fallacy

Postponement of public works in active periods would lead to greater industrial expansion, magnify depression and fail to equalize employment —Financing the deferred works during depression would place a strain upon the capital market

By WARD L. BISHOP
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DURING the past two years many people have advocated rather urgently that governmental agencies cooperate to curtail and postpone public construction during periods of prosperity, so that it may be used to take up the slack in employment during periods of depression. The supporters of this proposal include representatives of labor and industry, many students of economics and some of our highest public officials. They claim that this timing of public improvements would make depression less severe, not only by providing employment at that time, but also by *checking* business expansion during the preceding periods of prosperity.

The success or failure of the scheme depends upon the soundness of the latter claim: the ability of timed public construction to check business expansion. It is the purpose of this article to show that, if the plan were put into operation (say as soon as business recovers from the present depression), *expansion would be encouraged* during the next period of prosperity instead of discouraged, and that the effect upon the next period of depression would be the opposite of that intended.

Criticisms of Present Practice

Before examining the probable effects of manipulated public construction, however, it will be helpful to review the reasoning that is used to support the indictment of the unplanned public-works activities of the past. During periods of prosperity, cities, counties, states and the federal government spend immense sums on highways, public buildings, schools and other improvements. These expenditures mean increased demand for building materials and supplies, but they also place purchasing power into the hands of a greater number of wage-earners, whose demand for consumer goods is thus increased. So, it is argued, during the upswing of the cycle public construction is the source of a continuous stream of purchasing power flowing into the markets for materials and consumer goods, with the result that prices are raised and further business expansion is encouraged.

During depression the conditions are reversed. There is a surplus of goods; industry, over-expanded, reduces its payrolls; governmental agencies fail to support and encourage industry as they did during prosperity by means of public-improvement activities. Industry is thus left in a paralyzed state, to recover only after liquidation has run its course and the surplus of inventories has disappeared. This process is slow because industrial paralysis means unemployment and greatly reduced purchasing power. But if this stream of purchasing power flowing from public improvements were shut off during prosperity and turned on during depression, the advocates of timed public construction claim, expansion would not go so far during the former period; and since, also, employment would be provided for millions during depression, the period of liquidation necessarily would be shortened.

This reasoning is so plausible that it has commanded wide acceptance. It is supported, moreover, by statistical studies showing the amount of construction and construction wages that could have been shifted in past periods of prosperity and depression. There is a place for such quantitative studies, but these particular studies are unconvincing, because all other factors in the past cycles would not have remained the same if some billions of dollars of public construction had been shifted. One would think that we would never have had major cyclical fluctuations in industry if we had never built hard roads and school houses during prosperity!

It is in examining the financial aspects of the plan, however, that its unsoundness becomes apparent.

Financing Timed Public Construction

Postponed public improvements can be financed ultimately from only one source, and that is taxation. The taxpayer can pay for a new school building in advance, or he can pay for it on the installment plan after construction. By the first method, taxes would be maintained at a sufficiently high level during years of recovery and prosperity to enable each governmental unit to make an annual contribution to a public-works reserve fund, which would be spent by it when depression arrived. By the second method, no financial provision would be made ahead of time, but bonds would be issued at the time of construction and paid off by taxation, presumably before the arrival of the next crisis. Let us examine the effects, during prosperity, of postponed public construction financed by these methods.

Expansion Would Be Encouraged

Instead of looking at the effect of public construction upon the demand for goods and services and upon the price level, as advocates of the scheme have done, let us look at its effect upon the capital and labor markets—upon wages and interest. It is true that in the past public improvements have been financed largely by bond issues, funds being taken out of the capital market and placed directly or indirectly into the market for finished goods. This unquestionably tended to raise prices and, *in the initial stages*, to stimulate business expansion. But it is equally true, and this is the point that has been overlooked, that when a city borrows capital or when it hires labor it does so in competition with private enterprise and tends to raise market rates of wages and interest. The writer recalls well that a decade ago, when it was claimed that the high surtaxes on individual incomes were driving capital from industry into tax-exempt improvement bonds of states and cities, business leaders became much alarmed over this competition.

It should be remembered that it is not high prices *per se* that encourage industry, but high profits (or their probability); and high profits are dependent upon both prices and costs. During periods of prosperity the costs

of labor and capital tend to catch up with the rise in commodity prices because of the increasing demand for these factors of production, and they check business expansion by thinning profit margins. It would seem, then, that public improvement projects undertaken during prosperity, as they have been in the past, would serve sooner or later as a check upon the tendency of industry to over-expand, and any reduction in public construction at that time would tend to encourage industry by reducing labor and capital costs.

Now the collection of taxes for the purpose of accumulating public-works reserve funds would amount to an annual transfer of purchasing power from private purses to the public treasuries, where it would be saved for a few years. Are these funds to be buried or sterilized? That evidently is not part of the scheme, and obviously it would be uneconomical. They would doubtless be deposited in banks and invested by the banks in short- or long-term credits. States and municipalities, then, by curtailing their own demands for capital and labor during the upswing of the cycle, would increase the quantity of these factors of production available to industry.

Capital Accumulation Would Increase

The accumulation of these reserves, moreover, would actually increase the supply of capital at the disposal of industry by an amount greater than the curtailed demand by governmental agencies, because taxation for this purpose would tend to accelerate the annual rate of capital accumulation. That is, due to the added tax burden, some taxpayers would save less and spend as usual; others would save as usual and curtail their expenditures; and those who never save would be forced to spend less. Thus, the annual increments to the reserve funds would represent, partly, a substitution of public saving for private saving, and partly, a substitution of public saving for private spending. To the extent that the accumulation of the reserve funds would curtail spending by taxpayers, it would bring about an increase in saving (capital) for the country as a whole, the amount of which would, of course, depend upon the kinds of taxes levied and the relative burden placed upon various classes of taxpayers. This increase in capital would help to sustain a greater expansion program.

This increasing supply of capital, available at low interest rates, would not long remain unemployed; and private construction, home building and equipment manufacturing would have the same effect on prices, interest rates and wages as public construction. The merchant and the manufacturer of clothing are just as pleased to learn of an order by the Pennsylvania Railroad for new locomotives as they are to hear of new highway construction. While it would no doubt take expansion longer to get under way without the initial encouragement that public construction has provided, this would only have the effect of lengthening the duration of the upswing of the cycle; and once started, expansion in industry would go farther than it has in previous cycles, when it was forced to compete with public agencies for labor and capital. After reaching the limit of our powers of expansion we would have more new homes, larger plant capacities, more capital instruments of practically every variety, a greater surplus of inventories, a greater variety of commodities and, in the aggregate, larger balances owing on installment purchases. We would necessarily have more of those things since we had encouraged our labor and capital to produce them.

The effects of financing the postponed improvements by borrowing at the time of construction would be very similar to those of the reserve-fund method of financing just described. During either the period of prosperity preceding the depression that is to be relieved by the delayed public works, or the period of prosperity following that depression, the lessening of competition of states and cities with industry in the labor and capital markets would tend to reduce market rates of wages and interest, and thus encourage private construction and industry.

Bond Plan Also Encourages Expansion

During the period of prosperity following the depression in which the bonds were issued, taxes would be levied to retire the bonds. As the bonds would be retired, the bondholders would have the problem of reinvestment; and since the volume of government obligations would be decreasing, more and more funds would seek investment in private enterprise.

Moreover, since it is part of the plan that states and cities attempt to retire the bonds before the arrival of another depression, so that they may have ample borrowing powers at the time of these emergencies, there would be a speeding up of the return in the capital markets of funds taken out during depression for public construction. In the past the term of improvement bonds has usually been related to the estimated useful life of the acquired property, so that funds taken out of the markets in any one year were often not returned until 40 or 50 years later. Under the new plan, however, they would be returned within one cycle; and again public demands would not compete with private demands for labor and capital during years of business expansion.

Cannot Relieve Unemployment

By inducing a greater industrial expansion, timed public construction would magnify the depression it is intended to mitigate; in fact, the larger the volume of public works postponed the greater the slack in employment to be taken up during depression. All of the elements of an increased business expansion would serve to increase unemployment, and thus make more pronounced the inadequacy of the plan during depression. For example, larger inventories at the beginning of depression would necessitate a longer period of unemployment and liquidation; and a larger volume of installment balances would result in more people having installments to pay on a larger number of past purchases before they could buy new products of industry.

In the past an increased activity in the building trades and orders for equipment by public utilities and railroads have been among the first signs of the approach of recovery. But if these companies are encouraged to make larger fixed investments in plants and equipment and gear themselves up for an unprecedented volume of business, they can get along for several years of depression without making appreciable purchases of machinery and fixed assets; it would seem, from the reports of the steel industry and equipment manufacturers, that they are doing very well in this respect during the present depression. The rows of unsold houses built by real estate companies in 1928 and 1929 are anything but an inducement to undertake new building projects of this type at the present time; and if we had built more dwellings "ahead of time" during those years, we would now be looking still farther into the future for the arrival of an appreciable pick-up in building activities.

Moreover, the financing of postponed public works would place a strain upon the capital market during depression. In the case of the reserve-fund method of financing there would be a general withdrawal of government deposits from the banks within a short period of time, thus curtailing their lending powers or necessitating sale of some of their investments. If the bond method of financing is employed, the capital market would be called upon to absorb a large volume of state and municipal issues at a time when securities markets are likely to be demoralized. Since public construction is a *competitor* of industry for labor and capital, it would seem that the better time to carry out public improvement projects is during prosperity, when industry is likely to over-expand, than during a time of depression, when private enterprise needs the encouragement of low costs.

The Remedy Fails

In conclusion, then, our ability to level off the peaks of prosperity and fill in the valleys of depression by timing public works is more apparent than real. To ckeck industrial expansion during the upswing of the cycle by postponing public construction, it would be necessary for the labor and capital so released to be made unavailable to industry. But this would create unemployment of labor and capital at one time merely for the sake of employing them at another.

Granting the possibility of equalizing employment by regulating construction, it would be necessary to regulate and time *all* construction, both public and private. This hardly would receive general approval, in view of our past and current experiments with placing the government in business. Yet, without such control over private enterprise, timed public works will only be a boomerang. They would increase the slack in industrial employment during depression and would render the postponed public improvements inadequate to cope with unemployment.

Committee Reports on Old Age Pensions

OLD AGE PENSIONS are seen as a definite responsibility of employers by the committee on employees' retirement annuities of the Chamber of Commerce of the United States. In a report to the board of directors the committee, of which Redfield Proctor is chairman, makes the following recommendations:

Employers should develop some method for aiding and providing for the financial security of their superannuated employees.

Retirement of superannuated employees of long service on annuities is an aid to the profitable and efficient administration of business enterprise and is advantageous to employers, to employees and to the public.

The management of every enterprise that has or is likely to have employees of long service should adopt a definite retirement annuity plan.

Consideration should be given to the question of whether the entire expense of the retirement annuity plan should be borne by the employer or whether the plan should contain provision for participation by the employees.

In a retirement annuity plan it is essential that definite provision be incorporated specifying employees covered, retirement ages, service requirements and the amounts payable upon retirement.

A progressive step toward assuring the benefits of employees' retirement annuities to the large number of employees who do not remain with the same employer until reaching the retirement age would be for employers having annuity plans to permit employees whose connection with the company is terminated after a reasonable period of service to retain their annuity credits, properly safeguarded, to help provide for their old age.

Funds which either employers or employees have paid into a contributory plan should be fully safeguarded either through insurance or trust funds.

Adoption of public old age pension or relief acts should not deter employers from making provision for their own retired employees, since the trend of such legislation in the United States is in the direction of making provision solely for the care of aged and impoverished citizens, and is not ordinarily applicable to employees on the payrolls of private concerns.

Blocking of Panama Canal Caused by Three-Day Rain Storm

DETAILS of the storm that produced unusual floods in the Panama Canal Zone and caused slides into the canal are given in the Nov. 11 issue of *The Panama Canal Record*. The following is quoted from that issue:

Heavy rains over the watershed of Gatun Lake, beginning Nov. 6, caused suspension of traffic through the canal, beginning in the afternoon of Nov. 7, for the first time since October, 1923, due to the need of using the lock culverts to discharge excess water from Gatun Lake. Traffic was partly resumed on Nov. 8 but interrupted again by a slide in Gaillard Cut, on the east bank, about half a mile north of Gold Hill, which occurred in the early morning of Nov. 9. Transit was resumed in the afternoon of Nov. 11, with the passage of fourteen vessels not exceeding 25-ft. draft. At that time 53 vessels had been awaiting transit, 29 from the Atlantic and 24 from the Pacific. This was the first time since December, 1923, that a slide delayed the passage of ships through the canal; the last previous interruption was in 1920, from March 20 to 24.

The storm began on Nov. 6 and continued for approximately three days, accompanied during the latter part by high winds. The crest of the flood on the Chagres River, principal tributary of Gatun Lake, was reached at Alhajuela on Nov. 7, with an elevation of 113.92 ft., the highest since the rain of Oct. 23-24, 1923, when an elevation of 117.4 ft. was reached. The maximum flood record at Alhajuela is 121 ft. made in November, 1909.

Traffic through the canal was suspended in the afternoon of Nov. 7, when it became necessary to use the lock culverts in addition to the spillways to control the flood. Twelve of the fourteen gates at Gatun spillway were open, and in addition it was necessary to use the culverts at Gatun locks and to spill water through the culverts at Pedro Miguel and over the spillway at Miraflores. By these means the level of Gatun Lake was held to a maximum of 86.81 ft., the danger point being 87 ft. The probable maximum inflow into Gatun Lake at any one time was 250,000 sec.-ft.; the probable maximum spillage from the lake at any one time, 180,000 to 190,000 sec.-ft.; and the probable total yield or runoff from the Gatun Lake watershed, between 30 and 40 billion cu.ft., equivalent to more than the total Gatun Lake storage between El. 80 and 87 ft.

During the morning of Nov. 10 a slide covered 300 ft. of the Panama Railroad near trackspan bridge No. 38-1, between Summit and Pedro Miguel. Up to that time the railroad had suffered but slight interference from the storm. This slide covered the railroad to a depth of some 15 ft., necessitating transfer around until an emergency connecting track could be built. The connecting track was completed on the morning of Nov. 11. It is thought that it will take at least 30 days to clear this slide.

Slides occurred on the Madden Highway, causing a suspension of traffic for a few hours; air-mail schedules were disrupted; and in some places telephone lines were put out of commission. In some respects, notably in continuity of rainfall and possibly also in amount of run-off, this was a worse storm than that of Oct. 23-24, 1923, which caused the most severe flood since that of November, 1909. Complete data on the latest flood have not yet been compiled.

Research Advances Highway Economics

Maintenance problems take leading place at Highway Research Board meeting in Washington—Special requirements of materials for highway work studied—A new theory of frost heaving—First survey of state financing in its relation to highway finance completed

HIGHWAY maintenance problems and those introduced by the special requirements placed upon materials of construction in road service received a large amount of attention at the tenth annual meeting of the Highway Research Board, National Research Council, at Washington, D. C., Dec. 10-11. Numerous traffic and construction problems also were reviewed during the sessions.

Growing interest in finance and in the broader problems of highway economics was evident in the keen interest taken in Thomas H. MacDonald's report of the committee on highway finance. The future problems of the highway field and the need for economic research extending far beyond present methods, materials and road types were the subject of Willard T. Chevalier's talk before the board at its annual dinner, Thursday evening. After pointing out the present urgency for leadership in planning for the highway systems of the future Col. Chevalier raised the question as to who would provide such leadership. Would it come from such a group as the Highway Research Board or from outside the highway field? He hoped that it would come from within the field itself.

For the first time in the history of the board concurrent sessions were held on Friday, following the general session on highway finance. As a result the session devoted to traffic found it difficult to compete with the controversial discussions in the session on design, and interest in that session lagged.

Highway Maintenance

Wide divergence in methods of accounting by state highway departments has made it impossible to compile comparable data on actual maintenance costs, according to H. K. Bishop, chief of the construction division of the U. S. Bureau of Public Roads. Progress toward that end, however, is being made. The bureau is grouping the states on the basis of similarity of conditions. Further, it has divided maintenance work into its more important elements and has assigned weights to them as follows:

Element	Weight
Surface	50
Drainage and ditches	25
Shoulders	10
Structures (including bridges not over 20 ft. in length)	5
Roadside cleaning	5
Traffic service (the existence of road markers, safety signs, etc.	5
	100

Maintenance of large bridges is separately recorded. At the start the rating system has been made as simple as possible. To date, maintenance quality ratings are under way in twenty states; these will be completed during the coming year.

Turning to specific items of maintenance, the committee on maintenance in its report on ice removal from pavements (B. C. Tiney, Michigan) expressed itself as opposed to ice removal by the application of salts, because that practice exposes the pavement surface to alternate freezing and thawing and generally will result in spalling of concrete. The committee will, however, investigate pretreatment with bituminous materials to seal the surface and so check the penetration of the salt solution into the pavement. The committee plans to study types of gritty material for spreading on pavements and methods of handling them.

Attacking the subject of the maintenance of expansion joints and cracks from the point of setting down what would be an ideal filler and then attempting to see how closely it can be approached in practice, W. H. Root (Iowa), stated that there are at present about as many kind of fillers as there are people using them. However, to establish a starting point for their study the subcommittee has picked experimental roads in Connecticut, Iowa and California and has asked manufacturers to supply them with test materials prepared to meet five sets of specifications drawn up by the materials committee. Costs of the maintenance work are to be kept.

Bedding Courses for Brick Pavements

Studies of fillers and bedding courses for brick pavements, made by another subcommittee, have been directed toward sand mixed with tar or other bituminous materials because of the success obtained with such mixtures in a few places, notably Syracuse, N. Y., and on the 70 miles of concrete road resurfaced with brick in Illinois this year. The latter is the first extensive use of a mastic cushion. Both tar and cut-back asphalt were used.

One drawback found in the use of the bituminous filler material is the slipperiness it gives to the surface by adhering to the brick. This condition, according to Prof. J. S. Crandall (Illinois), can be relieved by coating the brick surface with whitewash or similar material before flushing on the filler.

In discussion C. N. Forrest stated that an ideal material would be one which could be mixed and laid at atmospheric temperatures. He does not believe that the specifications adopted by the American Society of Municipal Engineers will be found satisfactory. The committee believes that the asphalt emulsion fillers now used need to be improved.

The possible advantage of granulated slag as a bedding material were noted.

Dust Laying—A program of study of the use of deliquescent salt as a dust palliative and an outline of results so far obtained in the use of calcium chloride on two test road sections so far installed were given by Fred Burggraf, of the Research Board staff. One 6-mile test section is located in South Carolina and one in Missouri. It is hoped to have others in Nebraska, Indiana and Michigan. From studies so far made it has been determined that future study should be directed toward: (*a*) rate of evaporation of moisture from

treated and untreated surface; (*b*) the ability of the chemical to be absorbed or adsorbed by the binder; (*c*) the relative amount of potential dust on treated and untreated sections.

Mineral Aggregates

Most of the interested national organizations are now represented on the committee recently appointed to correlate research in mineral aggregates, and the committee has laid down a program for studying existing test data as to completeness and value.

Shale in aggregates was discussed in a paper by E. F. Bean, state geologist, Wisconsin, presented by W. J. Emmons, of the Michigan State Highway Laboratory, chairman of the committee. Dr. Bean described the possible sources of shales and the deleterious characteristics of many. In discussing the highway engineer's problem of avoiding the use of such shales he pointed out that it would be difficult to separate shale from gravel by methods depending upon differences in specific gravity.

Exception to this statement was taken by C. F. Lang (Minnesota). In Minnesota and Iowa most shales are light enough to make separation by specific gravity possible. Shales in Minnesota gravels are so light that they work to the surface in concrete pavements.

Prof. Emmons said that three methods of separation are in use—grinding, running over a rotating disk (specific gravity method) and hand picking.

Soundness Testing—Preliminary studies in comparison of the sodium-sulphate soundness tests with the repeated freezing and thawing soundness test were given by V. McCown, of the Bureau of Public Roads. A tentative standard for the former was adopted by the A.S.T.M. last June, and several states and interested associations have conducted tests using both methods. Results so far have been inconclusive, causing many to doubt the value of the sodium-sulphate test. All investigators agree, however, that, assuming the freezing and thawing test does give a measure of durability of the aggregate the quality of the cement paste or mortar has greater influence on durability of concrete than has the quality of the aggregates.

Ira Paul (New York) stated that the sodium-sulphate results are erratic and that magnesium sulphate will be found to give better results. Difference in the solubility of the two salts also is a factor.

A. T. Goldbeck emphasized the danger of drawing conclusions as to concrete durability from one factor such as the aggregate. Such factors as cement paste, proportioning, mixing and placing also have a determining effect. He favored the freezing and thawing test but declared that whatever test was decided upon it should be rapid and easily duplicated. Also, some method of correlating results should be set up.

Compaction of Earth Fills

Progress on a joint study upon methods of compacting fills (Highway Research Board and the A.R.B.A.) was reported by a committee on the subject. To date the committee's attention has been directed toward the use of wheel and crawler vehicles, wheel and crawler tractors, rollers, and the water jet. Work so far has been devoted to outlining procedure and classifying equipment. Two laboratory investigations are to be undertaken to determine some of the moot questions that appear to lend themselves to such study. There is, according to the committee, much economic loss due to too much as well as too little engineering applied to fill construction. Often, it states, a satisfactory fill can be built by end-dumping and jetting at costs far below those for a rolled fill.

Searcy Slack (Georgia) objected to this broad statement. He said it should be qualified because it was only true for homogeneous materials.

Pavement Reinforcement—The functions of steel reinforcement in pavement and pavement bases was the subject of a report by C. A. Hogentogler, F. A. Robeson and E. A. Willis, of the Bureau of Public Roads, to supplement early studies of reinforcement. This committee noted that one function of reinforcement is the control, not the elimination, of cracks in pavement. When concrete is in a plastic stage the distribution of steel rather than its area is important in controlling its movement, the committee finds.

The committee concludes that while research has amply demonstrated the value of reinforcing steel its disclosures are of value not in setting up a general rule but in forming the basis of rational design to meet local conditions.

In discussion the point was brought out that reinforcing, in addition to its effect upon the plastic mass, is essential in controlling the progressive opening of cracks in concrete pavement.

Culvert Inspection—R. W. Crum, director of the Highway Research Board, reported upon the beneficial results of the life-expectancy survey of culverts conducted in a number of states. So far, however, it has been found impossible to determine with any degree of accuracy the life of any class of culverts. Only in the case of culverts subject to progressive deterioration has it been possible to make relative comparisons.

Highway Finance

Encouraging words for highway research men came from Thomas H. MacDonald, head of the Bureau of Public Roads, in presenting the report of the committee on highway finance. He stated that he is impressed as never before with the importance of the testing and research work of state highway departments. The bureau, he stated, is insisting upon the expansion of such divisions in states where field control and testing are not up to general standards.

The finance committee's report was based upon a study of 1930 income and expenditure of the State of Wisconsin, made in cooperation with the University of Wisconsin, with special reference to the absolute and relative amounts expended upon highway work. Of the total spent on all highway work, 35 per cent comes from property tax, 33 from motor vehicles and gas, 15 from bonds and loans, 5 from federal aid and 11 per cent from miscellaneous sources.

Referring to the oft-raised question of whether bus and truck lines pay their share of highway costs, Mr. MacDonald stated that the survey shows that in 1930 the state spent about 1c. per vehicle-mile on the basis of total travel of all vehicles. Buses, however, paid in to the state 3c. per mile traveled and trucks 2c.

As the result of its survey the committee is impressed with the need for the reorganization of state governments to reduce the number of administrative units. Township organizations should be eliminated and in some instances county highway work might be consolidated.

M. W. Torkelson (Wisconsin), pointed out the difficulty of abolishing township organizations. Progress in taking over township roads in Iowa and Michigan was

noted in discussion. On the other hand, it was stated that in Ohio the township trustees have formed a powerful organization and now get a large share of the gas tax money.

Hot Cement

The subject of possible detrimental influence of hot cement, in a report by H. S. Mattimore (Pennsylvania), brought out a divergence of opinion as to its effect which indicated that geographical position is a factor to be considered. All agreed that the setting time of cement mortars is reduced by the use of hot cements, but men from Northern states reported no effect upon concrete because of the low specific heat of cement. On the other hand, in the South, where sand, stone and even the water may go into concrete at high temperature, the addition of hot cement has been found an important factor. The committee recommended that the maximum temperatures of fresh concrete be specified but made no recommendation as to the limit to be set.

The durability of concrete as affected by the water-cement ratio also was discussed by the same committee in a report in which it stated that it "notes with some concern an apparently growing tendency to use concrete mixture for pavements and other exposed structures which contain considerably less cement per unit of volume of concrete (and consequently higher water-cement ratios) than were formerly required." This, the committee said, is due to the fact that, for an equivalent cement content, the average present-day portland cement will produce concrete of much higher strength than was the case a number of years ago. In concretes where durability and resistance to wear are essential qualities the committee believes that strength alone should not be taken as the controlling factor in determining proportions. The committee stated that evidence of the effect of the water content upon the durability of cement paste is fairly clear, but the effect of the quality of the cement is not so clear yet.

F. H. Jackson (Bureau of Public Roads) stressed the dangers of using too high water-cement ratios with modern cements.

Volume Changes in Concrete

The need for research into the elastic properties of concrete was emphasized in a committee report on volume changes. The report noted especially the need for determination of the relationship between the modulus of elasticity of concrete and the physical properties of the aggregates of which it is composed. Lack of adequate information on plastic flow and thermal expansion were noted. Fine grinding of cement was stated to be a factor affecting plastic flow and volume changes.

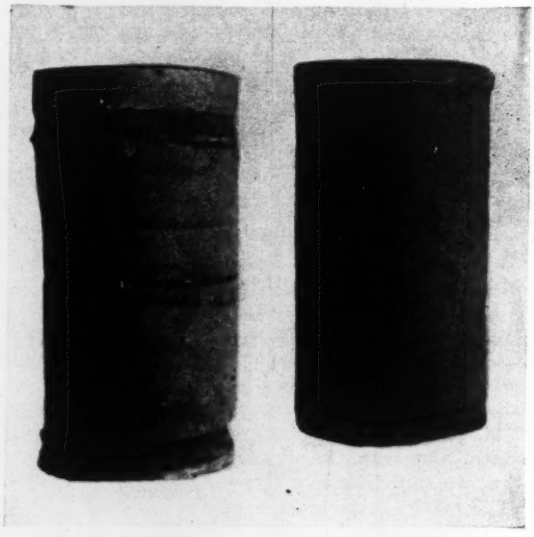
In discussion R. E. Davis (California) stated that the finer cement is ground the greater will be the shrinkage of mortar in air. He believes this a factor of special importance because of the present tendency toward the use of finer ground cements. Quality of the cement is a major factor in determining volume changes, Mr. Davis believes.

Progress in a study of methods of curing pavement slabs was reported by F. C. Lang (Minnesota), but no definite conclusions have been reached on subjects previously assigned. New subjects assigned to the committee are determination of the time that pavement should be kept wet and the use of special papers for curing. On the former Mr. Lang stated that present rules are based largely upon laboratory studies and do not adequately reflect field conditions. The committee hopes to report on this next year.

A. V. Bratt (Massachusetts) raised the question as to whether the use of chemicals and bituminous coatings might not be found to have a deleterious effect upon the surface of pavements in the future.

New Frost-Heaving Theory

A new explanation of why vertical movements in frozen soils in many locations are found to be far in excess of that which would be caused by the expansion of water in freezing was presented by A. C. Benkelman and F. R. Olmstead, Michigan state highway department. The theory is based upon an effect of the fluctuation of the frost line in soil due to fluctuations of temperature. When soil first freezes, ice crystals form between the soil particles, causing a slight expansion of the soil. With a rise in atmospheric temperature heat radiations from the interior of the earth cause the frost line to rise and the soil particles in the thawed zone settle back to normal position, leaving a thin cavity under the frozen layer, which, if the soil is saturated, fills with water. A fall in temperature sends the frost line down again, freezing this water into a thin layer of ice, and as the soil below freezes it again expands, raising the surface by the amount of its normal expansion *plus* the thickness of the ice layer.



Alternate freezing and thawing increases soil expansion

At the right is shown a cylinder of silt frozen in one operation; at the left is one frozen progressively from the top down by alternate freezing and thawing. When water is supplied from below by capillarity distinct ice layers form at each point where the cycle changes from thawing to freezing.

Experiments carried on in the laboratory of the Michigan state highway department supported the theory. Soil frozen in a glass tube in one continuous operation gave the normally expected expansion. The same soil progressively frozen by repeated thawings and freezings resulted in the formation of numerous thin layers of ice and produced expansion of the column far in excess of that resulting from one freezing operation.

The theory explains the heaving of sands and even gravelly material of low capillarity, such as found frequently in northern Michigan, when an excess of water is present. Cutting off the supply of water has in a

number of such places stopped the heaving, thus giving added support to the theory.

Some disagreement with detail of the theory developed during the discussion.

Determination of Soil Characteristics

Soil Mapping for Road Purposes—In response to the need for simple methods of determining soil characteristics useful to highway men, Prof. D. P. Krynine (Yale) has been conducting a series of studies which were reported in a paper by him. His object was to fix upon a method of expressing soil permeability in terms of the moisture equivalent of the soil and soil stability in terms of its shearing resistance. The method of determining the moisture equivalent described by Prof. Krynine is a modification of methods used in earlier research, but the method of determining shear resistance is new. It consists of driving a rigid metal stake $1\frac{1}{4}$x$1\frac{1}{4}$ in. in cross-section and 41 in. long to a depth of 12 in. into the soil to be tested. Through the medium of a wire 12 ft. long to which a simple dynamometer is attached the stake is overturned by a pull from an automobile. By correlating the amount of pull required and the form of the earth cracks and the disturbed cone the "shearing characteristics" of the soil are determined.

In discussion Prof. Eno stated that soil technologists have fallen down in not supplying highway engineers with simple tests for determining those characteristics of soil of interest to them. Prof. Krynine, he stated, has pointed the way toward simple determinations, and his methods warrant further study.

Rail Steel Bars—Results of a study of existing data relating to the characteristics of rail-steel reinforcing bars were reported by a committee set up at the request of the committee on materials of the American Association of State Highway Officials. The study and fact-finding survey were financed by the Rail Steel Bar Association. No new facts were brought out. The committee is of the opinion that no grade of reinforcing bar should be given blanket recommendation, that all should be required to pass A.S.T.M. specifications and that all which do pass will be found satisfactory. Lack of uniformity in bend testing methods were found, and the committee recommends that the proper organizations correct this fault in existing test methods.

Prof. W. K. Hatt, in written discussion, stated that the smoke of the controversy between manufacturers of competing grades of bars has largely obscured the facts and that as far back as 1913 he conducted a series of tests which supported conclusions similar to those of the committee.

Traffic Studies

A group of papers on various features of traffic was included under the report of the committee on traffic. A. N. Johnson, University of Maryland, reported upon a study being made by the university in connection with the Bureau of Public Roads to determine the *practical* hourly capacity of two-, three- and four-lane roads. Studies to date have given capacities as follows: Two-lane roads, 1,000; three-lane, 2,000; four-lane, 3,000, or an increase of 100 per cent by the addition of one lane to a two-lane road and of 50 per cent by adding a fourth lane.

In discussion J. Rowland Bibbins (Washington) stated that he hoped Dean Johnson's studies would be extended to signal-controlled city streets, where the superimposed signal system often will be found to be the limiting factor.

H. C. Dickinson reported upon a series of tests undertaken by the U. S. Bureau of Standards to determine the correctness of present regulations affecting headlights as to beam, angle and spread in open-road driving, minimizing glare in passing vehicles proceeding in the opposite direction, and beam spread best suited for all conditions. Outstanding among the conclusions reached to date are that beams should be horizontal with a spread of from 6 deg. vertical to 25 deg. horizontal, that there is no way by which a driver can be freed entirely from glare nor by which he can see past an approaching headlight, but that 90 per cent of present difficulties involved in passing would be eliminated by uniform intensity of headlights. An interesting feature of the study is a conclusion that a small amount of artificial highway lighting may prove to be more dangerous than no lighting at all.

Two other committees submitted reports to the traffic and transportation session: one reported a study on field methods of measuring tire wear and the other presented two papers on tractive resistance of motor vehicles and one on air resistance.

Comparative Bridge Costs

Highway Design—Three papers on the economics of low-cost bridge design drew a big crowd to the first session on design. The papers were on concrete bridges, by E. M. Fleming, Portland Cement Association; timber bridges, J. F. Seiler, American Wood Preservers Association, and steel bridges, by F. H. Frankland, American Institute of Steel Construction.

In a written discussion C. B. McCullough, bridge engineer, Oregon state highway department, stated that the three papers are a valuable contribution to highway bridge design studies. The only fault he found with them was a natural tendency to extend each class beyond its real field. H. H. Houk, bridge engineer, Alabama, stated that maintenance costs generally are minimized in such studies. Also, he laid stress on the fact that in studying any bridge site the question of whether future line or grade changes would eliminate the bridge often is a controlling factor in determining type.

Load Restrictions—A study of load limitations made for the purpose of furnishing the basis of discussion of the problem by the bridge committee of the American Association of State Highway Officials with a view to reaching a solution satisfactory to both highway men and the trucking industry was presented by A. L. Gemeny. Restrictions for the three bridge classifications of the state highway officials were proposed in the paper and diagrams for the determination of permissible gross loads were given.

Subgrade Treatment—Progress on a study of subgrade drainage and treatment being carried on by the Bureau of Public Roads, the Ohio highway department and the experiment station of Ohio State University was summarized by Prof. F. H. Eno, of the university staff. Numerous methods of treating subgrades under concrete pavements are being tested and the results evaluated on the basis of crack ratios.

Results so far obtained indicate that a porous sub-base of material finer than 1-in. diameter reduces cracking in the overlying pavement. The most advantageous depth has not been fixed, but indications are that from 2 to 4 in. is sufficient.

Treatment of the sub-base of traffic-bound slag roads with lime, soda ash, sodium silicate, salt, crankcase oil or crude oil have given definite indications of improving the road, especially in the spring.

Field Observations of Highway Practice

Selection of Materials Stressed in Connecticut Penetrated Stone Roads

By C. S. HILL
Associate Editor, Engineering News-Record

Rigid size control of hard tough stone and a bitumen chosen to suit traffic, time and location of construction essential to success

BITUMINOUS MACADAM is classed as a primary road type in Connecticut practice. Because of its adaptability and simplicity and the availability of good materials and of generally good subsoils it is an economical type. The intelligent selection and control of materials are considered the means of success in its construction. This does not imply that foundation and pavement design can be neglected, but that they rely for full success on the quality of the paving materials, the skill with which they are used and the regard paid to temperature and weather conditions.

General Design Practice

The theory governing all design practice is that pavements are designed for specific conditions. Foundation and pavement structure are therefore determined by conditions of subsoil, traffic and loadings. The pavement is flexible, and therefore stability requires an unyielding foundation; subsoil conditions determine the foundation structure that may be expected to satisfy this requirement.

Subsoils capable of ready drainage and with good bearing power will often carry the pavement without a constructed foundation. More retentive and weaker soils will need to be so strengthened. In these cases the foundation ranges from 6 in. of sandy gravel thoroughly compacted to a telford-like structure of field stones 10 or 12 in. thick, thoroughly rolled and sealed with gravel also rolled. Generally a well-graded gravel provides an adequate foundation. When used it is considered good practice to carry the gravel layer out to the ditches to improve the drainage.

A 5- to 7-in. slab of combined base and penetration course provides an adequate thickness range. The base course, never less than half the thickness, is rolled and filled with clean sand or, less advisedly, with stone screenings. Screenings from a cementitious rock are objected to; a porous void filler is wanted and not a seal. The best design is a base course 6 in. wider on each side, then the top course, to prevent breakdown of the edges of the penetration course.

Sizes and Quality of Stone

A well-defined opinion concerning size and quality of stone has come from experience. The best results, it is believed, will be obtained with body stone of uniform size for both base and penetration course. The ideal size for trap or other rock having a percentage of wear not greater than 3 is $2\frac{1}{2}$ to $1\frac{1}{2}$ in. For keystone applied to the top course after the first penetration, commercial $\frac{3}{4}$-in. stone (1 to $\frac{5}{8}$ in.) is preferred, and for cover after the second penetration commercial $\frac{1}{4}$-in. ($\frac{5}{8}$- to $\frac{3}{8}$-in.) stone is employed. It is believed that larger than $\frac{1}{4}$-in. stone, sometimes used for both key and cover, gives a better key course.

Intense traffic and heavy loading require a stone having a percentage of wear as low as 3 and a toughness as high as 12. A stone is required that will compact under the roller to a close interlocking bond without crushing. Uniformity of voids is essential, particularly in the penetration course; a stone that crushes in rolling causes dense spots. In the same manner stone that does not rigidly conform to grading ($2\frac{1}{2}$ to $1\frac{1}{2}$ in.) forms in places dense pockets of small stone. This spotty density shows up most disastrously to surface smoothness in the top course, but it is only a little less damaging in the base course because the flexible penetration course soon reflects every hump and hollow in the base.

Generally more rigid selection is required for top-course stone. Cubical shape, cleanliness, toughness and strength are most important here. In addition to cleanliness, care should be taken that the stone does not come from rock of a slick or greasy character. Bitumen will adhere to stone of this sort no better than to one coated with dust. Also stone for the top course should be more evenly spread and more carefully rolled. The depth should be particularly controlled. Ordinarily it should be from 2 to 3 in., depending on the size of the stone. A rule that works well is to make the depth equal to the screen size of the largest stone. A much greater depth may prevent full penetration, and much less depth may result in a fat spot. The objective is that after some wear the stone shall form a mosaic that takes the wear of traffic.

The amount of trap required per square yard of $2\frac{1}{2}$-in. top course is 240 lb. of body stone, 50 lb. of keystone and 38 lb. of coverstone. In cold weather the amount of coverstone is reduced to 25 or 30 lb. No loose coverstone should be allowed.

Kind and Character of Binder

The binder is selected to suit conditions. Ordinarily it is asphaltic oil with a penetration between 85 and 100. For light traffic or for fall work a higher penetration oil (100 to 120) is used. Too soft an asphalt promotes corrugation. It is found that binder of this low penetration shows little displacement under traffic in warm weather; and if traffic has been heavy enough to iron down the surface before cold weather, there will be no checking or scaling.

The depth of the top course determines the amount of bitumen required. A general rule is: gallons per square yard at 60 deg. equals inches in depth of stone. For a $2\frac{1}{2}$-in. top course $1\frac{3}{4}$ gal. a yard are used for the first penetration and $\frac{3}{4}$ gal. a yard for the second penetration. For a 3-in. top course the first and second applications of asphalt are 2 gal. and 1 gal., respectively. These amounts of binder assume hard tough stone; less bitumen is used for softer stone.

Pavement construction consists of three operations—

spreading, rolling and penetrating. All are mechanically simple processes, but the care with which they are conducted determines the extent to which the value of the closely controlled materials is capitalized in pavement structure.

Considering first the body stone of base and top, even spreading is an absolute requisite. Evenness is required not merely in depth of loose stone but in uniform distribution of sizes; otherwise the course will not roll to even thickness and solidity. If there is segregation of sizes in spreading, there will be hard and softer areas, or potential humps and hollows, which will develop under traffic into actual irregularities of surface. Good spreading, therefore, goes beyond the first laying down of the stone, whether by mechanical spreaders or by hand spreading, to a final dressing in which stone is added or removed and the course is trued up and given a uniform void texture. This exactness is employed particularly on the top course. Practicalities are not lost sight of, and sandpapering is not attempted.

Particular care is required in spreading keystone and coverstone. The keystone follows the first penetration and is spread while the bitumen is still hot. Its purpose is to fill the surface voids, and no more stone than this requires should be used. Under rolling the keystone should just fill the voids and be settled firmly into the binder. Any stones not so keyed in and bound should be removed. Anything like a surface mat of keystone is avoided. Similarly, following the second penetration no more coverstone is spread than will fill the surface voids and blot up the bitumen. The amount required will vary with the temperature of the air and road surface; more is required in warm weather. Stone not embedded is swept off the road.

Perhaps the crucial process in bituminous macadam construction is the rolling. Foundation, base course and penetration course require repeated rolling. The objective in rolling the base course and the top course before penetration is primarily to interlock the stone. When this is accomplished, no more rolling is required, and it never should be continued to the point where the stone begins to crush and grind down. A three-wheel roller giving a pressure of 800 lb. per inch width of tire is a proper weight of roller. The more particular task is rolling the penetration course. Here surface profile, interlocking and turning up the flat stone face are sought. With a good cubical stone, rolling will work the flat faces up to an astonishing degree. The importance of this action lies in the fact that the wearing surface sought is a mosaic of stone. After penetration no amount of rolling within reason is excessive.

Penetration requires consideration with regard to condition of materials and weather. Modern pressure distributors make bitumen application a closely controlled and uniform process. The clear dry condition of the stone, the clean open channels it provides for the oil to penetrate, the temperature of the oil (275 to 350 deg.) and the temperature of the air and surface stone are the controlling conditions. Temperature of air and stone are considered so important that penetration work in cool weather should be avoided.

Connecticut bituminous macadam road with stone curbs

While the care that has been indicated in the selection of materials, and equal care in their use, are necessary for the most successful results with penetrated stone roads, they are requirements common to all high-type roads, among which bituminous macadam, as built in Connecticut, is classed. Bituminous macadam is not considered advisable under all conditions. Unstable soil prevailing over long distances offers little warrant for this construction. Even if drainage and foundations can be made to overcome to a great extent subsoil faults, it is wise to select a structurally stronger pavement. Experience has shown, however, that bituminous macadam constructed with care and of good materials is truly a heavy-traffic road. Where it has not proven so, the reasons have been improper design, unsuitable materials or faulty construction, and not the depreciating action of traffic.

The data and opinion in this article are from field observations and from information obtained from the Connecticut department of highways. John A. Macdonald is commissioner, E. C. Welden is deputy commissioner, and G. E. Hamlin is superintendent of repairs.

ENGINEERING LITERATURE

A Monthly Review of Books and a Listing of New Publications

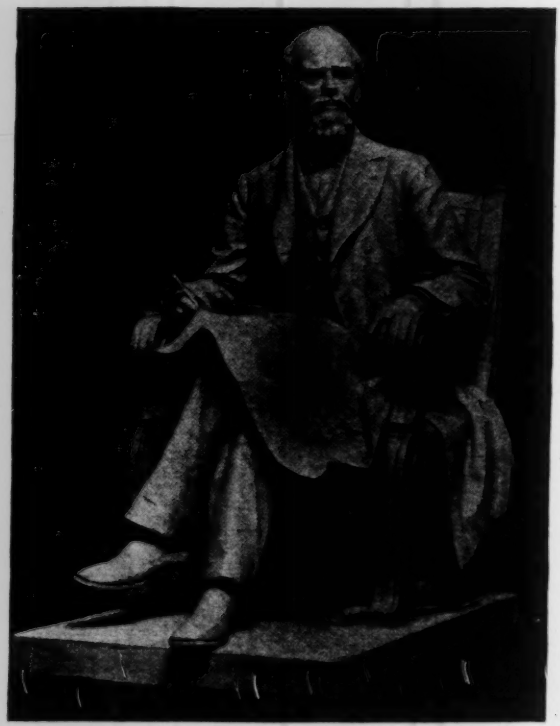
The Roeblings and Their Work

THE ROEBLINGS: A Century of Engineers, Bridge-Builders, and Industrialists—The Story of Three Generations of an Illustrious Family 1831-1931—By Hamilton Schuyler. Princeton, N. J.: Princeton University Press. Cloth; 6x9 in.; pp. 423; halftones and line cuts. $5.

THREE generations of engineers and manufacturers, with a fourth in training, is the remarkable record of the Roeblings. The founder of this illustrious family of engineers, John A. Roebling, and his son, Col. Washington A. Roebling, have long been known to the world as engineers of the Brooklyn Bridge. The long and important services of two other sons is far less well known, even in engineering circles: Ferdinand William, Sr., "financier, supersalesman and politician," who was secretary and treasurer of the John A. Roebling's Sons Co., 1876-1916, and Charles Gustavus, "engineer and master builder," who succeded his older brother as president in 1877, owing to the poor health of the latter, and continued as president until his death in 1918. Thus three sons of the founder filled high offices in the company. Moreover, at the age of 84, Col. Roebling resumed the presidency, which he held until his death in 1926. A member of the third generation, Karl, son of Ferdinand, Sr., was president from 1918 until his death in 1921, and on the death of the old veteran, Washington, another son of Ferdinand, Sr., also bearing the name of Ferdinand, became president, which office he still holds. The family tradition is being maintained by the two sons of Ferdinand, Jr., of whom Joseph is already "training in the industry," while Ferdinand 3d expects to do the same on finishing his university course. It seems safe to say that never before have so many generations of engineers and manufacturers been so well covered in a single volume as is done in Hamilton Schuyler's "The Roeblings."

Charles Gustavus Roebling
Not so widely known as his father and his brother Washington, but engineer and from 1877 to 1918 president of the John A. Roebling's Sons Co.

The book partakes somewhat of the family history character, which is justifiable in this case, since it is intended primarily for the general reader; but both the value and the interest of the book are increased by interspersing "engineering details" written by "recognized authorities, including John A. Roebling himself." Moreover, sketches of the careers of his two brothers, Ferdinand and Charles, written by Col. Roebling soon after their death, are reprinted, and also a notable paper by the same hand, entitled "An Inside View of a Great Industry," the latter covering the half century from 1870 to 1920.



John A. Roebling, Bridge Builder and Wire Maker
A statue erected at Trenton, N. J., by contributions from citizens and his sons.

The historical narrative carries the Roebling family back to German ancestors of note, in 1560, but makes its real start with the birth of John A. Roebling, in Mulhausen, in 1806. John's parents aided in founding the town of Saxonburg, near Pittsburgh, Pa., in the 1830's. Before this, John had been educated in Germany, finally specializing in foundation work, bridge building and dike construction. The bridge-construction and the wire-manufacturing work of John A. Roebling, his sons and grandsons are all outlined in this book, sometimes in detail. The deplorable death of John in the early days of Brooklyn Bridge construction and the bodily crippling of his son Washington in caisson work, his sticking to the bridge nevertheless, and his long and remarkable subsequent career are interestingly told, as are also the main features of the development of the Roebling wire works after they were transferred from Saxonburg to Trenton. The wonderful succession of suspension bridges built wholly on in part by the Roeblings are passed in review, ending with the recently opened Hudson River bridge between New York and New Jersey—the account of which was written for this book by C. C. Sutherland, chief bridge engineer of the Roebling company, who was in charge of the cable construction.

Of the much that might be written about the book enough has been said to show that it is a volume deserving a place in every comprehensive engineering library and of course in the library of every bridge engineer and also of every engineer who values engineering biography, of which we have far too little in America.

A Pioneer in Its Field

REVIEWED BY DAVID CUSHMAN COYLE
Consulting Engineer, New York City

NOISE AND VIBRATION ENGINEERING—By Stephen E. Slocum, Ph.D., M.Am.Soc.C.E. New York: D. Van Nostrand Co. Cloth; 6x9 in.; pp. 171; line cuts and illustrations. $2.75.

DR. SLOCUM'S book on "Noise and Vibration Engineering" is a pioneering book rather than a final treatise. It is written for the engineer who is engaged in construction or transportation work, not to supply him with all he needs to make him an expert vibration engineer, but to point out the various features of the subject. The control of serious vibration in actual practice is a specialized branch of engineering which requires judgment based on experience; it cannot be picked up out of a book. Moreover, the subject is still in its infancy; there are still large areas of knowledge about vibration which have not yet been explored. At the present time the most important service that can be rendered along this line is that of defining the field, in order that engineers in other lines may become familiar with the nature of the problems involved and build up the necessary pressure to bring about an extensive study of them. That service Dr. Slocum's book is well qualified to perform.

The volume starts with an introductory chapter on the transmission of elastic ground waves. It is noted that a violent shock applied to sand is largely lost before it gets well into the sand but that waves with low energy content will pass long distances in sand with little damping. The presence of groundwater is noted as a serious cause of high transmission.

The second chapter describes Dr. Slocum's tests of vibration dampers, and presents typical results but not complete tables of characteristics. It is pointed out that the insulator has to be arranged with reference to its unit deflection, its unit stress and the range of velocities, so that the total system may not get into resonance with the excitant. The tests show that hair felt is generally superior to corkboard. The lead-asbestos pads commonly used for buildings showed about 5 per cent damping, for the low-frequency vibrations used in testing. A steel bar, not constrained by bolting, gave considerable damping at the contact, and sand and gravel were found to act in the same way, the damping being largely independent of the depth.

The third chapter gives a number of details of isolation of tall buildings and emphasizes the necessity of draining groundwater. The next chapter deals with street traffic, the shocking effect of motors with few cylinders and solid tires, the various types of noise coming from street cars, and the present state of experiments for reducing these noises. This subject is continued in Chapter V as regards subway traffic.

Under machinery insulation the author describes a device which places the insulating material in shear and avoids anchor bolts through the insulation. The elements of acoustics are treated, with a table of coefficients of sound absorption and a brief account of the principles of soundproofing of buildings and airplane cabins.

Chapter VII, on the economic aspects of noise abatement, consists of arguments which can be used by the engineer in attempting to persuade his clients to spend the necessary money to get a satisfactory insulation and suitable legal protection. Chapter VIII contains the basic mathematical theory of free, forced and damped vibration in a convenient form. The last chapter consists of eight pages of bibliography dealing with seismology, acoustics, traffic and machinery vibration.

The book will be valuable to the engineering profession in general, as a guide in solving simple problems in vibration and in recognizing the cases that call for the services of a specialists in the subject.

Concrete Tanks and Reservoirs

REVIEWED BY WILLIAM S. HEWETT
Structural Engineer, Minneapolis, Minn.

REINFORCED-CONCRETE RESERVOIRS AND TANKS—By W. S. Gray, B.A., M.A.I. (Dublin), Assoc.M.Inst.C.E.I., M.N.Z. Soc.C.E. London: Concrete Publications Limited, 20 Dartmouth St., Westminster, S.W.1. Cloth; 6x9 in.; pp. 178; 119 line cuts and halftones. 10s.

MR. GRAY'S book deals with nearly every possible form of tank and reservoir construction and design. The author makes himself clearly and readily understood by the introduction of many numerical examples. The work is very well arranged and indicates a thorough knowledge of the subject.

Circular tanks are first considered and the wall stresses and joining of wall to floor discussed. A chapter is devoted to gasholder and tar tanks. Other chapters deal with: circular tanks of large diameter; open reservoirs; reservoirs with counterforted walls; open rectangular tanks below ground; rectangular tanks above ground; floor and wall joints and drainage; swimming baths and tanks; tanks with conical or pyramidal floors; covered tanks; large roofed tanks in waterlogged ground; examples of completed reservoirs and notes on design and construction. In the chapter on covered tanks, flat slab, and beam and slab roofs are discussed at considerable length. Dome roofs for circular tanks are not considered.

The author has failed to devote any space to shrinkage and temperature stresses, a clear understanding of which is so important in the design and execution of structures of this character. Designers too often fail to appreciate the difference between structures in which cracks in the concrete are of vital importance and structures in which such cracks may be safely neglected. A careful consideration of the data on shrinkage of concrete now available will enable the designer to gage very closely the magnitude of cracks that will develop in a reinforced-concrete section due to any combination of stresses. Such consideration would prohibit the use of $2\frac{1}{2}$ per cent of reinforcing steel in any section that is to be subjected to material tension.

There are but few reinforced-concrete structures used for the storage of liquids in which it would be safe to neglect temperature stresses in making the design or planning the execution. Failure to appreciate fully the importance of these stresses leads to the design of structures for the storage of hot liquids in which only the stresses due to internal pressure are considered and resulting practically in total failure.

In neglecting to give what the reviewer regards as due consideration to shrinkage and temperature stresses the author has followed most writers on this subject. Expansion joints are presumed to remedy the trouble. But expansion joints cannot be used in the side walls of a circular tank, and where it is possible to use them they

are often designed and located by experience or rule of thumb. If the troubles due to these causes are to be remedied by expansion joints, then the designer should be well informed regarding the changes that will occur and stresses that will be set up due to shrinkage and temperature.

The author has collected in one volume much useful information. As he states in his preface, "the book should be useful to an engineer who has not before undertaken this class of work, while the experienced designer will find the information presented in handy form."

Better Hydraulic Formulas

REVIEWED BY H. K. BARROWS

Consulting Hydraulic Engineer, Boston; Professor of Hydraulic Engineering at Massachusetts Institute of Technology.

ÜBER GESCHWINDIGKEITSFORMELN—Von W. Soldan, Landesanstalt für Gewässerkunde und Haupnivellements im Preussischen Ministerium für Landwirtschaft, Domänen und Forsten. [Besondere Mitteilungen Bd. 7 Nr. 1.] Berlin: Ernst Siegfried Mittler & Sohn, Kochstrasse 68-71. Paper; 10x14 in.; pp. 30; tables, maps and line cuts. 6.5 marks.

"BETTER velocity formulas," by Soldan, is the latest volume of a series of publications by the Prussian minister of agriculture dealing with river hydraulics and other phases of river regulation.

Soldan's experimental work, used as a basis for this report, was carried out on the Weser River during 1903-06. He also makes reference to the work of Bindeman on the River Memel, 1912-15, and derives empirical velocity formulas in the form of $V = CR^xS^y$, departing somewhat from the Chezy-Kutter formula in more general use in this country.

Soldan's chief contention appears to be that previous velocity formulas have been derived from data covering long stretches of river, whereas in his work he took many shorter stretches of river and used the mean of all results in deriving formulas for velocity. Thus for the Weser, he determined $V = 25.24\ R^{0.744}S^{0.450}$ based upon 46 separate determinations, finding departures from this formula of about +26 and —15 per cent in his series of data.

The monograph contains detailed data of Soldan's observations on the Weser as well as other tables and numerous diagrams. Hydraulic engineers will be interested in studying it in some detail.

Long-Time Planning for City Works

STABILIZATION OF EMPLOYMENT IN PHILADELPHIA Through Long-Range Planning of Municipal Improvement Projects—By William N. Loucks, Ph.D., Research Associate Industrial Research Department and Assistant Professor of Economics, University of Pennsylvania. [Research Studies, Wharton School of Finance and Commerce.] Philadelphia: University of Pennsylvania Press. Cloth; 6x9 in.; pp. 341; 42 tables; XX diagrams. $3.50.

A CURRENT mass uprising, apparently successful, against adding 35½c. to the Philadelphia tax rate and increasing water rates by 50 per cent adds to the interest of Dr. Loucks' able research study of long-range planning of public improvements with particular relation to forestalling unemployment. His study is a local one along somewhat the same line as the countrywide study by Leo Wolman in his portion of "Planning and Control of Public Works," a report by the Committee on Recent Economic Changes of the President's Conference on Unemployment, reviewed in these columns on Sept. 18, 1930, p. 464.

Dr. Loucks has made an intensive study of the dollar volume of public improvements in Philadelphia for ten years; its distribution in the several municipal fields; its volume year by year compared with unemployment; the time it takes to carry a project from its initiation to the beginning of construction, which to many will seem surprisingly long, and the possibilities of reducing this time. He also considers how the construction work of the ten years reviewed might have been advanced or delayed to fit unmployment conditions; the percentage of construction cost that goes to labor, both in the first place and in four or five subsequent turnovers to and by material men; and the need of ways and means for long-time planning, both of the projects themselves and their finances.

The general conclusions of the book are that by long-time planning of municipal public works and by hastening and retarding construction as the conditions demand, unemployment in Philadelphia could be considerably reduced and at the same time construction costs lowered by less work at the higher and more work at the lower unit prices then prevailing.

The author fully realizes that the greatest problem of all those he reviews is how to provide long-time planning and if provided to insure the following of the plans. The local government conditions long prevalent in Philadelphia and that have contributed largely to the present financial plight of the city and the taxpayers' uprising already noted do not give much hope for carrying out the program outlined by Dr. Loucks, but that is a reflection on the citizens of Philadelphia rather than on the program. The program deserves careful study in all our cities, with the idea of local application after modifications to meet differing conditions. This is true quite regardless of the problems of unemployment.

Russian Publications on Welding

REVIEWED BY LEON S. MOISSEIFF

Consulting Engineer, New York City

THAT the Russians are giving much attention to welding is shown by a journal on the subject, now in its second year, a volume of transactions of a second convention devoted to welding and two booklets on the subject. All are printed in Russian, with titles and other descriptive matter as indicated in English in the headings preceding the following descriptive notes.

AVTOGENOIE DELO (WELDING): Organ of All Union Welding Trust—Year 2: Nos. 1 to 9. Moscow, Center, Ilinka 3: U.S.S.R.: Book Publishing Bureau OGIZ. 4 rubles, or $2 a year.

The welding industry in the Soviet Union has been organized into an All Union Welding Trust, which devotes itself to the entire welding industry in that country. Its monthly magazine treats in a practical way the various applications of welding in the entire field of metal construction and machinery. Considerable attention is paid to developments in countries outside of the Union. It is profusely illustrated. That the magazine meets the demand successfully is evidenced by the fact that the first number of the current year was published in 5,500 copies and the ninth has reached 9,800 copies.

AVTOGENOIE DELO (WELDING): Transactions of the Second Convention of the All Union Committee on Welding. Published by the Scientific Chemical-Technical Publishing, N.T.O., V.S.N.C.H., Leningrad, U.S.S.R. pp. 285. 3.50 rubles, or $1.75.

The transactions of the convention named above include eighteen papers by Russian engineers on various problems in welding. Arc and gas welding and the application of welding to structural steel as well as to containers are discussed. From the point of view of the civil engineer, I would point to the 34-p. paper by A. S. Ogievetzky on the "Application of Arc Welding to Metal Structures." It leans largely on American welding practice for steel structures and gives a full presentation of the state of the art.

GAS AND ELECTRIC ARC WELDING in Accordance With American Practice—By P. I. Ivashkevitch. Published by State Publishing, Moscow, U.S.S.R. pp. 96. 0.5 ruble or 25c.

Evidently a series of pamphlets intended for workmen of the lowest qualifications. It describes welding in plain language and with the aid of about 50 sketches.

GUIDE TO ARC WELDING: Part I—Published by Leningrad District Publishing, Leningrad, U.S.S.R. pp. 32. 0.4 ruble, or 20c.

Based on the work of the German Committee on Technical Education, it gives in a condensed form, with the aid of many sketches, instructions for the proper procedure of welding.

Publications Received

TWO BULLETINS by the Division of Sanitation (C. A. Holmquist, director), New York state department of health, Albany, N. Y., deal respectively with "Rural Water-Supply and Sewage-Disposal Systems" and "The Operation of Swimming Pools and Bathing Beaches."

FIVE PORTFOLIOS ON "Wood Sash and Frames" have been issued by the West Coast Lumbermen's Association. 364 Stuart Bldg., Seattle, Washington: I—"Construction Principles"; II—"Residences and Apartments"; III—"Schools and Hospitals"; IV—"Office and Monumental Buildings"; V—"Industrial Buildings." Paper; 9x11 in.; photographs and line drawings. Free on application.

THE FIRST NUMBER of the *Journal* of the Clay Products Institute of America (1240 New York Ave., Washington, D. C.) appeared as of September, 1931. Besides proceedings of the organization there are a half-dozen papers and reports: "Lessons From the American Concrete Institute for the Clay Products Institute," by Harvey Whipple; "Can the Clay Products Institute Supplement the Work of American Society for Testing Materials?" by C. L. Warwick; "The Clay Products Institute From the Standpoint of the Structural Engineer," by S. C. Hollister; "Water Penetration Through Brick-Mortar Assemblages," by L. A. Palmer; "The Use of Clay Products in Sound Insulation," by C. L. Chrisler; "Brick Fillers and Bedding Courses for Street Pavements," by John S. Crandell. 50c. single copy or $1 a year.

A DATE LINE of September, 1931, marks Vol. I, No. 1, of the *Journal of the Southern Islands Society of Engineers and Architects*, published at Cebu, Cebu, Philippine Islands, at 0.2 peso an issue. Juan Macaraeg, president of the society, contributes prefatory greetings, in which he fitly remarks, "Of the making of journals, magazines and even of books there is no end." Cebu's problems appear to be much like our own. One article, for example, argues that building construction should be supervised by competent engineers and architects (apparently Cebu has no building law). Incidentally, this article contains an interesting piece of news: "Contractors and engineers must have learned of the unexpected collapse of a bridge in New York where the required limit of stresses were duly specified, and by not following the specifications, the bridge collapsed at a consequent loss of many lives." We would suggest that until New York papers confirm the reported occurrence it would be well for journals in reprinting the item to be sure that they give credit to the Cebu source.

COMPARATIVE DATA on "how American cities are weathering the present financial depression" make up a 19-p. quarto pamphlet by Frederick L. Bird entitled "The Present Financial Status of 135 Cities in the United States and Canada." (25c. from Municipal Administrative Service, 261 Broadway, New York City.) Inquiries were sent to the 326 cities of over 30,000 population in the two countries, but replies were received from only 135. The author says that while these cities "constitute a representative cross-section of all population groups," probably the 181 that did not reply "include an abnormally large proportion of those which are in serious financial difficulties." Among the points covered are the extent to which delinquent taxes are increasing, deficits in meeting expenses from current revenue, unemployment burdens on city treasuries, action to curtail expenditures, reductions in salaries and wages, and the extent to which cities are approaching their long-term borrowing capacity. The main conclusion drawn from the data is that "the majority of American cities are not thus far meeting the emergency in their financial affairs with a sufficient degree of foresight and management."

STRESSES IN RAILROAD TRACK is the subject of two recently published papers. The first is entitled "Stresses in Railroad Track," by S. Timoshenko and B. F. Langer, presented before the December meeting (1931) of the American Society of Mechanical Engineers; the second is a bulletin of the American Railway Engineering Association (No. 339) entitled "Rail Stresses and Locomotive Tracking Characteristics Found in Tests on the Great Northern Railway," by J. Paul Shamberger and B. F. Langer. Both papers are the results of studies made by engineers of the Westinghouse Electric & Mfg. Co. in their investigations of the tracking characteristics of locomotives. The work is largely an amplification of the extensive studies carried on by the special committee on stresses in railroad track of the American Engineering Association and the American Society of Civil Engineers under the direction of Prof. A. M. Talbot. In the study carried out by the Westinghouse engineers special attention was given to local stresses within the rail itself, using a magnetic strain gage developed by J. G. Ritter, also of the Westinghouse company. The paper before the Mechanical Engineers deals primarily with the theory used as a guide to the experimental research work and the A.R.E.A. bulletin is a compilation of the results obtained in the test work.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

AUTOMOBILE OPERATING COST AND MILEAGE STUDIES—By Robley Winfrey. Bulletin 106. Paper; 6x9 in.; pp. 56; tables and line cuts. Free on application to Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa.

THE BRIDGES OF THE RHINE: Roman, Medieval and Modern. An Account of Notable Bridges Over the River Rhine and Its Tributaries, With a Description of Those Recently Built—By Karl Möhringer, Bridge Engineer. Messkirch, Baden: Joh. Möhringer. Cloth; 9x12 in.; pp. 104; many illustrations. 25 marks in Germany.

ELECTRICAL EQUIPMENT ON MOVABLE BRIDGES—By Condé B. McCullough, Bridge Engineer, Oregon State Highway Department, Albin L. Gemeny, Senior Structural Engineer, Division of Tests, Bureau of Public Roads, and W. R. Wickerham, Electrical Engineer. Technical Bulletin 265, U. S. Department of Commerce. Paper; 6x9 in.; pp. 114; photographs and line cuts. 35c. from Superintendent of Documents, Washington, D. C.

HOUSE INSULATION: Its Economies and Application—Report of the Subcommittee on House Insulation: Its Economies and Application, of the National Committee on Wood Utilization (U. S. Department of Commerce). Paper; 6x9 in.; pp. 52; photographs, tables and line cuts. 10c. from Superintendent of Documents, Washington, D. C.

OCCUPATIONAL DISEASE LEGISLATION—Report of Committee on Standard Practices in the Problem of Compensation of Occupational Diseases of the Industrial Hygiene Section, American Public Health Association. Published for the American Public Health Association, 450 Seventh Ave., N. Y. C., by the Chemical Foundation. Paper; 6x9 in.; pp. 124; tables. $1.50.

A PRACTICAL HANDBOOK OF WATER SUPPLY—By Frank Dixey, O.B.E., D.Sc., F.G.S., F.R.G.S., Director of Geological Survey, Nyasaland. London: Thomas Murby & Co., 1, Fleet Lane, E.C.4. Cloth; 6x9 in.; pp. 571; halftones and line cuts.

THE RESISTANCE TO WEAR OF CARBON STEELS—By Samuel J. Rosenberg, Bureau of Standards. Research Paper No. 348. Reprint from Bureau of Standards *Journal of Research*, Vol. 7, September, 1931. Paper; 6x9 in.; pp. 18; photographs and line cuts. 10c. from Superintendent of Documents, Washington, D. C.

RUN-OFF INVESTIGATIONS IN CENTRAL ILLINOIS: A Report of an Investigation Conducted by the Engineering Experiment Station, University of Illinois, in Cooperation With the Bureau of Public Roads, U. S. Department of Agriculture—By George W. Pickels. Bulletin No. 232, Engineering Experiment Station, Urbana, Ill. 70c.

SUPPLEMENT TO RECOMMENDED MINIMUM REQUIREMENTS FOR PLUMBING: Progress Revision, May, 1931—By the Subcommittee on Plumbing of the Department of Commerce Building Code Committee. Washington, D. C.: Bureau of Standards. Paper; 6x9 in.; pp. 3; bound with the report are several tables and line cuts.

SURFACE WATERS OF TENNESSEE: With a Chapter on Flood Conditions for Rivers Other Than the Mississippi—By Warren R. King. Prepared in Cooperation with the United States Geological Survey and the Corps of Engineers, U. S. A. Bulletin 40, Division of Geology, Tennessee State Department of Education, Nashville. Paper; 6x9 in.; pp. 165; photographs, tables and line cuts.

TRANSPORTING THE A.E.F. IN WESTERN EUROPE 1917-1919—By William J. Wilgus, Member Military Railway Commission to England and France, Director of Military Railways, A.E.F., Deputy Director General of Transportation, A.E.F. New York: Columbia University Press. Cloth; 7x10 in.; pp. 612; maps and tables. $12.50.

VENTE ET PUBLICITE—Por E. Rachinel et M. Buisson. Third edition, 1932. Paris: Donod. Cloth; 4x6 in.; pp. 500; tables and illustrations. 20 francs.

LETTERS TO THE EDITOR

Horizontal Forces Acting on a Pile

Sir—The published letter of Dimitri P. Krynine (*ENR*, Nov. 26, p. 860) reports some observations on the action of a horizontal force on a vertical pile. Mr. Krynine states that by actual test the zero point of rotation was located at a depth of 0.52 h to 0.69 h, averaging close to $\frac{2}{3}$ h.

This is in fair accord with the following stress analysis. The vertical bearing power of a soil is proportional to its depth, a fact that may readily be demonstrated by forcing a rod vertically into the soil of uniform material. The horizontal bearing power is accordingly assumed to be proportional also, as noted in Fig. 1. The actual bearing power at a depth x is represented as cx.

The displacement of the pile in the soil is represented by diagram B in Fig. 1, the zero point being at $a\,h$, the amount of the displacement at a depth x being $b - \frac{b}{a\,h}\,x$.

Diagram C in Fig. 1 represents a pile with the soil-stress diagram, which is the product of a and b and which happens to be a parabola.

Fulfilling the requirement that $\Sigma H = 0$, it is readily shown that $P = bc \int_0^h \left(x - \frac{x^2}{ah} \right) dx$

Whence $P = bch^2 \left(\frac{1}{2} - \frac{1}{3a} \right)$

and $bc = \frac{6\,Pa}{h^2\,(3a - 2)}$

Fulfilling the additional requirement that $\Sigma M = 0$

$$P\,(l + ah) = bc \int_0^h \left(x - \frac{x^2}{ah} \right)(ah - x)\,dx$$

Whence

$$P\,(l + ah) = bch^3 \left(\frac{ah}{2} - \frac{2}{3} + \frac{1}{4a} \right)$$

Substituting in this equation the value of bc, as obtained above, yields an equation from which it is found that:

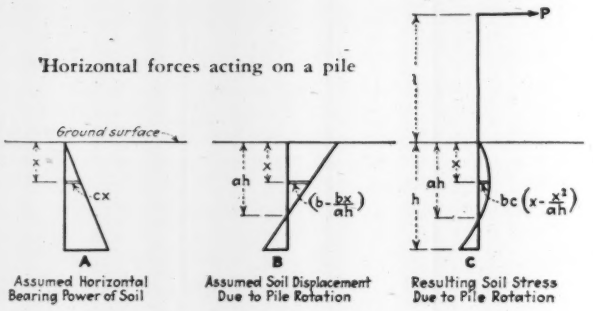
$$a = \frac{2l + 1.5h}{3l + 2h}$$

Critical values are when: $l = -\frac{2}{3}\,h$, $a = \infty$. This means simply that for this condition the parabola is a straight line and there is no tendency for the pile to rotate. When $l = -.50\,h$, $a = 1.00$. With this condition the vertex of the parabola is half-way down and the stress at the bottom becomes zero. When $l = 0$, a becomes equal to .75. As l increases further, a approaches $\frac{2}{3}$ as a limit.

For conditions where the horizontal pull on the vertical pile is above ground it will be seen that the range of a is between .75 and .67, which compares with .69 and .52 as found by Mr. Krynine. These results are not strictly comparable because Mr. Krynine does not specify the points of application of his horizontal forces. His results are somewhat smaller than those determined here but not enough to be of practical importance.

Detroit, Mich.
Dec. 1, 1931.

L. C. WILCOXEN,
Assistant Civil Engineer, City Engineer's Office.



Less Roadbuilding in Sight

Sir—It is regrettable that the editorial "Less Roadbuilding in Sight" in your issue of Oct. 22 should have been printed. To my mind it is very misleading, and woefully pessimistic.

The emergency appropriation of federal aid this year was primarily an "unemployment" measure. It was available only for new construction to be completed before Sept. 1, 1931. It was to be repaid from future federal appropriations. It was to be matched by unexpended federal-aid appropriations. Therefore it was a federal contribution to help solve the problem of unemployment. To my mind, the big thing in it was the committal of future congressional sessions to a continuance of federal-aid appropriations, for by that method only was it to be paid—from future deductions of federal aid apportioned to the several states.

The percentage conclusions in the editorial are open to much criticism. Federal aid participates in the states only on certain routes and on a percentage basis of the cost of the improvement. Therefore the available federal money is no measure of the amount of work done by the states in roadbuilding; it is only a measure of participation in the class of road and route necessary to secure federal-aid allotment.

Back of the proposition referring to future roadbuilding by the respective states are the now practically universal gasoline taxes, registration fees, drivers' licenses and such. There have been some advances in some of these levies in some of the states, so that it is reasonable to expect that the revenues in 1932 will be sufficient to keep up the program of maintenance and new construction.

I would much rather have read an editorial on the diversion of gasoline taxes and motor car licenses, etc., to other than road purposes in several of our states, and a hot criticism of such procedure.

As to the reference in the editorial to "public lands," it is my belief that there are specific appropriations made, apart from the federal-aid moneys, to build roads in our national parks, for instance. If I am correct, then the deductions for canceling the advances made this year will in nowise affect road construction in the so-called "public lands."

It is highly probable that there will be an increase in 1932 of the amounts received by the states from gasoline taxes, even where the tax rates have not been advanced. Personally I look to increased consumption in 1932 on gasoline, and that means increased revenues to the states. It is very probable that it will be sufficient in itself to offset the federal deductions. When you distribute sixteen millions over 48 states, it would average but one-third of a million dollars per state, but the law of averages does not apply to this question. I do not believe your fears that 1932 may be a lean road construction year are justified.

Harrisburg, Pa.
Oct. 28, 1931.

FRANK B. BOSCH,
President, Motor Club of Harrisburg.

NEWS OF THE WEEK

Contracts Specifying Hand Labor Attacked as Illegal

A suit has been filed by Attorney E. A. Walton, of Salt Lake City, attacking the legality of several contracts in connection with the construction of that city's new storm sewer project. Mr. Walton contends that the contracts, which specify that hand labor instead of machinery be used, are illegal because they provide for unnecessary additional expense to the city in the use of hand labor instead of machinery. The use of hand labor was specified to help provide work for the unemployed.

San Francisco Bay Bridge Co. Pays Bond Interest

The San Francisco Bay Toll Bridge Co., operating a private toll bridge across San Francisco Bay between San Mateo and Alameda counties, has paid the interest due on its first mortgage 6½ per cent sinking fund bonds. This interest was deferred Nov. 1, the date upon which it became due (*ENR*, Nov. 19, p. 824).

Home Firm Gets Los Angeles Bridge Contract Under New Law

Taking advantage for the first time of a new law which gives cities and counties of California the right to give preference to home firms bidding on public works, the board of supervisors of Los Angeles County on Dec. 7 awarded to the Consolidated Steel Corp., a Los Angeles concern, the contract for the steel for a 400-ft. bridge to be built across the mouth of Alamitos Bay connecting the cities of Long Beach and Seal Beach via Ocean Ave.

Although the corporation was second from the low with a bid of $13,100, it was given the preference over the Virginia Bridge & Iron Co., of Roanoke, whose bid of $12,500 was the lowest.

The contract for the wood construction part of the bridge was awarded to John Strona, of Pomona, Calif., whose bid of $54,868 was low.

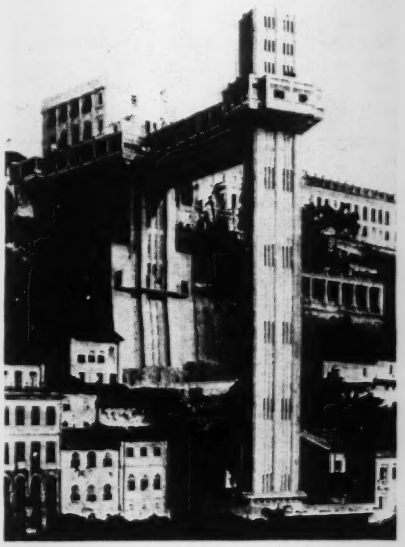
United States Asked to Complete Rio Grande Flood-Control

The commissioners court of Hidalgo County, Tex., has adopted a resolution offering to turn over to the United States government the county's Rio Grande flood-control works, without expectation of reimbursement, if the government will assure the completion, maintenance and operation of the project. The commissioners court of Cameron County will consider taking similar action. The latter county has spent the proceeds of a $1,500,000 bond issue in this construction work and the Hidalgo County work was financed out of $3,600,000 of bonds and warrants.

The United States government can complete the flood-control project without negotiating a treaty with Mexico, as no international question is involved, it is stated.

Colorado River Aqueduct Water Bonds Declared Valid

Legality of the $220,000,000 issue of Colorado River aqueduct water bonds voted in September by the Metropolitan Water District of Southern California has been established by the superior court of Los Angeles County, Calif. The court validates the bonds and upholds the validity of the election at which the bonds were carried by a five-to-one majority. The judgment will become final in 30 days unless an appeal is taken.



VERTICAL CITY TRANSIT

This tower solves the problem of transporting the greater part of the population of Bahia, in northern Brazil, between the business center of the city, bordering on the bay, and its residential district, on the top of a steep incline 195 ft. above. The tower is made of reinforced concrete, is 240 ft. high and is connected with an older and smaller structure by a bridge. In it are housed two express elevators. On the opening day 10,000 persons were transported, and on the second day more than 24,000, each passenger paying 160 reis, or a little less than 2c., a trip. The elevators were installed by the Otis Elevator Co.

Reorganization of Mount Hope Bridge Co. Planned

Plans for reorganization of the Mount Hope Bridge Co., which owns the bridge connecting Bristol, R. I., and Portsmouth, R. I., are being considered by the committee for the holders of the first mortgage sinking fund 6½ per cent gold bonds, according to an announcement sent to bondholders last week.

The bridge has been in receivership since last June. Reorganization of the company has been recommended by Rudolph F. Haffenreffer, receiver appointed by supreme court. No change in tolls is contemplated, and plans to have the state buy or take over the span have been dropped entirely, the receiver said.

Earnings of the bridge company in the twelve months ended Oct. 31 were only $147,452.51, without allowance or reserve for depreciation. Interest payments on first mortgage bonds, now to be suspended, as of Dec. 1, required $185,250, leaving a deficit of $37,797.49.

New York Man Charged With Illegal Practice of Engineering

Edwin R. Cotton, an aide of George C. Diehl, highway superintendent of Erie County, N. Y., was arrested on Nov. 27, charged with violation of section 1462 of the educational law of New York State by practicing professional engineering illegally. The warrant was sworn to by Fletcher H. Burke, representing the New York State Society of Engineers. Cotton was released under a bond of $250 and trial was set for Feb. 25. Specifically, Cotton was charged with doing the work of an engineer in drawing up plans and specifications for the construction of a sewage treatment and disposal plant at the Erie County home and infirmary at Wende.

Crew of 400 Resume Full-Scale Operations on Rodriguez Dam

Construction work on the Rodriquez dam, Mexico, has been resumed with a crew of 400 men after a year of curtailed operations with only a skeleton force resulting from a decline in the revenues of the Northern District of Lower California. Gen. Agustin Olachea was appointed governor Nov. 1 and ordered work to be resumed within a month. Foundation work on this structure was described in detail in *Engineering News-Record*, Oct. 16, 1930, p. 600. The project will be rushed to completion because of the need for additional water supplies at Tijuana and Agua Caliente.

Private Engineering Work by City Employees Protested

The practicing engineers and surveyors of Rochester, N. Y., are waging a campaign to restrict engineers on public payrolls from engaging in private work. City Manager Story has issued a memorandum to the employees of the city engineering department requesting them to refrain from doing such outside work. The practicing engineers and surveyors assert that a recent check shows that during October twenty-two maps were filed in the bureau of buildings. Of these, fourteen were signed by city employees; during November eleven maps were filed, of which five were signed by city employees.

Deep Water Port Proposed at Mouth of Rio Grande

An international commission of engineers representing Mexico and the United States will be appointed soon by the respective governments to investigate the feasibility and practicability of creating a deep water port at the mouth of the Rio Grande, according to Pascual Lopez, head of a group of business men of northeastern Mexico who have been active for some time in promoting the project. Mr. Lopez explains that the proposed port will be constructed at the joint expense of the two countries, but that it will function separately, with docks and terminals on each side of the river.

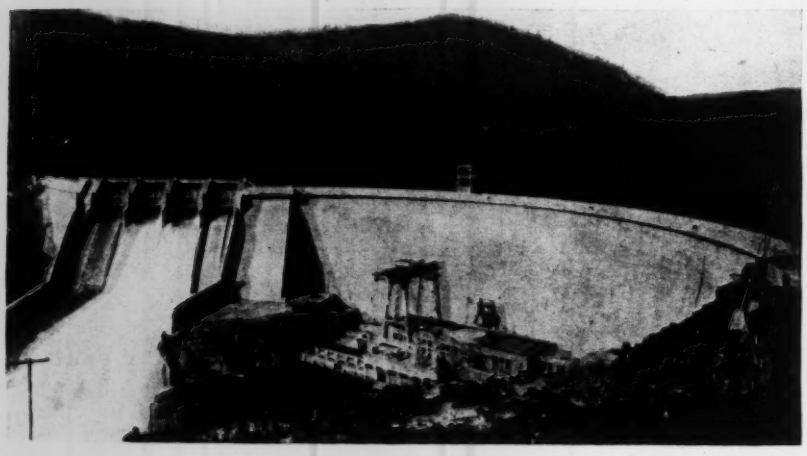
Home Loan Discount Banks Are Proposed for Home Financing

A BILL to establish a system of twelve home loan discount banks that should be able to render prompt relief to building and loan associations, banks and other home-financing institutions throughout the country which are short of liquid funds has been introduced in the House of Representatives by Robert Luce, of Massachusetts. Mr. Luce's measure embraces the principal features of the program outlined by the President in his message to Congress. It has both emergency and permanent value. Many banks and building and loan associations have found difficulty in meeting requests for withdrawals of funds, for renewals of mortgage loans and for new mortgages and this condition has resulted in great hardship to thousands of families that have been unable to renew mortgage loans, has hampered the sale of homes and has discouraged legitimate new construction. The new system is expected to relieve such strained conditions and remove an important obstacle to the resumption of home building. It will also serve in normal times to assist home-financing institutions in making adjustments between available funds and demands.

Some idea of the magnitude of the proposed system may be gained from the fact that the initial capital of the discount banks is fixed at a minimum of $150,000,000. The bill contemplates that ultimately this will all be held by subscribing building and loan associations, savings banks, trust companies, state and national banks, and insurance companies that may decide to join the system. To insure against delays at the start, the measure authorizes the appropriation of $150,000,000 by the federal government for working capital, with provision for its eventual return to the federal treasury as the system becomes well established. With this initial capital the twelve banks could finance from one and a half to two billion dollars for the borrowing institutions, raising funds by means of bond or note issues. Bonds and notes to be issued will be of a type to appeal to conservative investors.

General supervision of the system is to be in the hands of a board of supervision of home loan discount banks, consisting of five members appointed by the President.

An important feature of the bill is a provision designed to permit, for a period of 3½ years, building and loan associations or other institutions not now permitted by state laws to subscribe to stock to become affiliated with the system. The period allotted will give the state legislatures time to pass any legislation necessary to allow institutions within their states to comply with the provision that an institution desiring to borrow from the discount banks must subscribe $2,500 plus 1½ per cent of its home mortgages.



ARIEL DAM, ON LEWIS RIVER, WASH.

The Ariel dam of the Inland Power & Light Co. on the Lewis River, Wash., 32 miles north of Portland, Ore., creates a lake 12 miles long. Recent precipitation and runoff has filled this reservoir and required the use of the spillway section. The dam, which is a variable radius, constant angle, arch-type, is 1,251 ft. long on the crest and stands 313 ft. high from the lowest point in the foundation to the top, and extends 123 ft. below the bed of the stream. The power house, built for two units with foundations and penstocks set for two more, now contains one 45,000-kw. generator. Although the period of tests and adjustments on the unit has not been completed and the plant has not been turned over to the operating company, the generator has run intermittently in recent weeks supplying energy to the system of the Northwestern Electric Co., Portland. The project was constructed by the Phoenix Utility Co.

Kentucky's Toll Bridge Program Nearing Completion

Kentucky's $10,000,000 toll bridge construction program is nearing completion. It is probable that the last of the bridges will be dedicated next spring. The one at Maysville, across the Ohio, was opened a few weeks ago and the Cumberland River bridge at Smithville was dedicated on Nov. 28. Two more bridges, the Green River bridge at Spottsville and the Tennessee River bridge at Paducah, will be dedicated this month.

The bridge over the Cumberland River at Canton is expected to be completed about Jan. 1 and those at Tyrone over the Kentucky River and at Eggner's Ferry over the Tennessee River are expected to be put into operation about March 1. Last autumn the bridge over the Ohio River connecting Ashland, Ky., and Coal Grove, Ohio, was completed and bridges over the Kentucky River at Boonesboro and over the north fork of the Cumberland River at Burnside were dedicated on Nov. 11 and Nov. 12, respectively. Indiana and Kentucky are cooperating in building a bridge over the Ohio River joining Henderson, Ky., and Evansville, Ind.

All the bridges will be toll free after the bonds sold to finance them are retired. All the Ohio River bridges are of the cantilever type excepting that at Maysville, which is a suspension bridge. The other bridges are of the truss type.

Nicaragua Canal Not Justified by Shipping Needs

NO ECONOMIC justification for a canal across Nicaragua is found as the result of a resurvey and re-estimate of the cost of the proposed canal and an analysis of the traffic capacity of the Panama Canal. This conclusion has been reached by Lytle Brown, Chief of Engineers, U. S. Army, after examination of the report of the Interoceanic Canal Board authorized by Congress in March, 1929. The original board consisted of Major Gen. Edgar Jadwin, Col. Ernest Graves, Sydney B. Williamson, Anson Marston and Frank M. Williams. Since the board was appointed in June, 1929, Mr. Williams and General Jadwin have died, and their places have been filled by Roy G. Finch and Lieut.Col. Dan I. Sultan.

An estimate of the present capacity of the Panama Canal is 70,000,000 tons, or sufficient for the maximum traffic to be expected by 1970. This capacity can be increased to 107,000,000 tons by the construction of a third set of locks at an estimated cost of $140,000,000. Construction of the locks would require ten years.

With larger vessels to be expected by the time enlargement is required, the capacity may be as high as 145,000,000 tons, with the assumed maximum capacity of 48 lockages per day. By lowering the summit level in the canal from El.40 to 37.3 it will be possible to use 2.6 ft. additional storage in Gatun Lake, or sufficient for six additional lockages in a typical dry season, and by still further lowering to 32.3, the assumed elevation of the upper sill of the proposed third locks, five more daily lockages may be obtained.

Repumping of water holds out possibilities of a still further increase.

Conversion of the Panama Canal into a sea-level canal is estimated to cost a billion or more dollars, and to require 25 to 35 years if done without serious interruption to canal traffic.

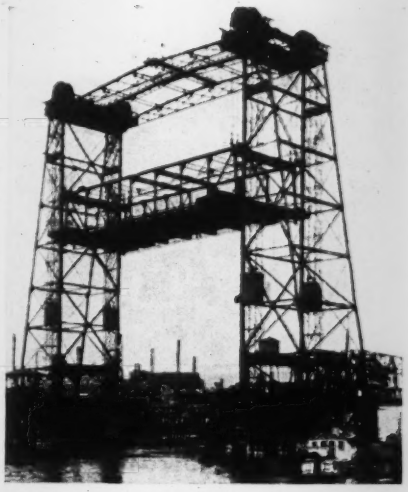
Nicaragua Canal

The route selected for the projected canal across Nicaragua extends from Brito on the Pacific up the valley of the Rio Grande, thence down to Lake Nicaragua, up the San Juan River and through the Conchuda Hills and across the Danta and San Francisco rivers, and up the valley of the Limpio to the divide; thence down the valley of the Deseado to the Caribbean Sea near Greytown. Three twin locks, 1,200 x 125 ft. x 42.5 ft. deep on each side of the divide, are proposed.

The summit level of the canal, which concludes all of Lake Nicaragua, would be at El. 110. The maximum depth of cut would be 344 ft., as compared with 494 in Culebra Cut at Panama.

Engineering cost, including 15 per cent for contingencies, is placed at $576,000,000. To this is added $41,000,000 for civil administration, $30,000,000 for medical provision and sanitation, $25,000,000 for rights and land, and $50,000,000 for fortifications and military, bringing the total to $722,000,000.

The capacity of this canal is placed at 80,000,000 tons per year.



CHICAGO'S NOTED OLD LIFT BRIDGE TO BE REMOVED

The South Halsted St. lift bridge over the Chicago River, built in 1894 and now to be replaced by a double-leaf bascule bridge (see *ENR*, Oct. 15, 1931, p. 629). This bridge, which was designed by J. A. L. Waddell, consulting engineer, has trusses operating between steel towers 215 ft. high and has maximum headroom when raised of 155 ft. The bridge has become too light for present traffic and loads.

Competition for Bridge Design

For the purpose of continuing its program of encouraging improvement in the esthetics of steel bridge design, the American Institute of Steel Construction offers three cash prizes of $500, $250 and $100 in a competition open to bona fide registered students of structural engineering and architecture in recognized technical schools of the United States and Canada. The subject of the design is a steel highway bridge. The problem is defined by the following description:

At a crossing of a parkway or boulevard over a double-track railroad it is desired to construct a highway bridge of a character befitting its purpose and location. The roadway width is 40 ft. between curbs and there are two sidewalks on each side 6 ft. wide. The clear span of the structure is 50 ft. and the clearance over track centers, from top of rail to under side of bridge is 22 ft. The approach grades at both ends are 5 per cent.

The jury of award will consist of architects and consulting bridge engineers of national reputation. Preliminary drawings must be received at the executive offices of the American Institute of Steel Construction, 200 Madison Ave., New York City, by March 19.

President Sends $5,000 Check to Engineers' Relief Committee

President Hoover has donated $5,000 to the Professional Engineers' Committee on Unemployment "with no particular restrictions as to its use," H. deB. Parsons, general chairman of the committee, has announced. The President's check was contained in the following communication to Mr. Parsons:

My dear Mr. Parsons:

The devoted effort of your committee in securing employment and relieving distress among professional engineers has my sympathetic approval. I feel that the inherent administrative ability of American engineers to meet and cope with emergencies is sufficient assurance that any funds made available to you will be well administered and used to the best advantage, not only in finding useful employment but by relieving individual cases of distress with small loans under liberal terms, which particularly appeals to me.

Having been informed that your committee intends, if sufficient financial support is forthcoming, to extend its activities to a national scope, I am inclosing check for $5,000, with no particular restrictions as to its use but as an encouragement of the splendid spirit which has inspired you and your associates in this undertaking.

Yours faithfully,
HERBERT HOOVER.

Hoover Dam Notes

A pioneer heading has been started at the outlet of tunnel No. 1. Up to now the portal of this tunnel has been inaccessible, the pioneer heading being carried forward from an adit some distance above the portal. During the week ended Dec. 5 the 12x12-ft. pioneer headings in tunnels No. 1 and No. 4 advanced 343 ft.

Grading of the Black Canyon highway from the intersection of the Boulder City highway to the top of the incline railway is complete. The Mojave County (Ariz.) road from Kingman to the dam site has been opened. This new highway reduces the distance from Kingman to Las Vegas by 70 miles.

Buildings now under construction by Six Companies, Inc., will house 2,000 employees in Boulder City. As it is now apparent that more than that number will prefer to reside there, it is planned to continue the building program.

With the opening of Congress, legislation is being sought by various interests to clear up several controversial points concerning the status and obligations of residents and contractors within the federal reservation surrounding the project. Disputed points include the right of the states to collect poll and property taxes within the reservation; the right of residents to vote; the right of the states to enforce their mining and safety laws; and the obligation of the federal government to establish and maintain recreational and school facilities at Boulder City.

Gardner Williams Dies

Gardner S. Williams, for many years a leader in hydraulic engineering, died on Dec. 12 at his residence in Ann Arbor, Mich., at the age of 65. Mr. Williams was born in Saginaw, Mich., and was graduated from Cornell University in 1889. After service with several water companies and a five-year term as civil engineer for the board of water commissioners of Detroit, he went to Cornell University in 1898, where until 1904 he was professor of experimental hydraulics in the college of civil engineering and engineer in charge of the hydraulic laboratory. From 1904 to 1911 he held the chair of civil, hydraulic and sanitary engineering in the University of Michigan. Since 1911 he had devoted his attention to consulting engineering practice, with offices in Ann Arbor. From 1903 to 1905 he was a member of the International Waterways Commission.

During the war Major Williams saw active service as a member of the construction division. He was a member of many engineering and allied societies and served as a vice-president of both the American Society of Civil Engineers and of American Engineering Council. In recent years he had been very active in the affairs of the latter organization.

Death of H. E. Vautelet Recalls Building of Quebec Bridge

Henry E. Vautelet, who died in Montreal recently, was a figure of international prominence in the engineering field twenty years ago as head of the first board of engineers for the Quebec bridge. Following the collapse of the first Quebec bridge, a private enterprise, on Aug. 29, 1907, and the subsequent investigation of the accident by a royal commission, the dominion government, in 1908, appointed a board of engineers to plan and direct the construction of a railroad bridge at the same site, to be owned by the government. Mr. Vautelet, then bridge engineer and assistant chief engineer of the Canadian Pacific Ry., was named chairman and chief engineer of this board; the other members were Sir Morris Fitzmaurice, of Great Britain, and Ralph Modjeski, of the United States, the composition of the board being international in recognition of the formidable magnitude of the project as well as the sensational character of the failure of the first attempt.

The completed design for a cantilever bridge of 1,800-ft. span was developed by the board's engineering staff, under Mr. Vautelet's personal direction, being completed about the end of 1909. Question then developed within the board as to whether this design should be the only one considered for construction or whether bidders should be invited to submit alternative designs. Mr. Vautelet held strongly for the former course, but his colleagues disagreed. Before bids were called, however, Sir Morris Fitzmaurice resigned from the board, being succeeded by Charles MacDonald. The reconstituted board also favored inviting alternative bids, and such alternates were therefore permitted, under load and stress specifications formulated by the board.

Designs and bids were received from the most important bridge-building concerns throughout the world, including German, English, Canadian and United States bridge shops. Lowest in price were the designs submitted by the newly formed Canadian company, the St. Lawrence Bridge Co., but this design did not accord with the specifications inasmuch as it was proportioned for lower loading. The board disagreed in its opinion of the respective merits of the designs and bids quite as sharply as upon the prior question of permitting alternative bids, Mr. Vautelet favoring the lowest bid on the official design, while his colleagues favored the lighter design of the St. Lawrence Bridge Co. The differences became so acute that the government called in two additional bridge engineers to sit with the board in passing on the plans, M. J. Butler, of Montreal, and Henry W. Hodge, of New York, being named. The enlarged board recommended the light design of the St. Lawrence Bridge Co., which thereupon was adopted for execution. Mr. Vautelet disagreed with the majority findings and resigned from the board early in 1911.

Following these dramatic events execution of a contract and the development of working plans followed by construction of the bridge went forward in highly able and successful manner, under the personal care of C. N. Monsarrat, who succeeded Mr. Vautelet as chairman of the board. As will be recalled, the fabrication and construction of the bridge by the St. Lawrence Bridge Co., with Phelps Johnson, G. H. Duggan and George F. Porter leading in the work, had a further tragic accident when, in 1916, the huge suspended span slipped off its support while being hoisted from barges to its position 150 ft. above, carrying down with it a number of workmen and requiring the construction of a new suspended span. A year later, on Sept. 20, 1917, the new suspended span was finally lifted to place, completing the great structure.

Intercity Traffic Safety Contest Is Announced

The National Safety Council has announced plans for an intercity traffic safety contest for 1932 with the object of stimulating better traffic law observance and enforcement throughout the nation. The cities will compete by making monthly reports of their traffic fatalities to the National Safety Council and by reporting their accident prevention activities, such as enforcement, regulation and public education. All cities will be divided into groups according to population as follows: over 500,000; 250,000 to 500,000; 100,000 to 250,000; 50,000 to 100,000; 25,000 to 50,000; under 25,000. Trophy awards will be made in each class.

WASHINGTON NOTES

By PAUL WOOTON

Washington Correspondent

Relief Plan to Be Drafted for Reclamation Projects — Wagner Advocates Public Works Program

AS THE Reclamation Bureau has been informed that a number of the projects will experience difficulty in meeting their construction payments next year, the reclamation committee of the Senate has undertaken to draft a relief plan. Several months ago a meeting was held in Boise at which representatives of 23 reclamation projects in nine states prepared a plan for a blanket moratorium for three years. This moratorium would be without interest.

Elwood Mead, commissioner of the Bureau of Reclamation, has made a counter-proposal. In a conference with Senators from Western states last week, Dr. Mead raised objections to granting a blanket moratorium and suggested instead that relief be extended only to the individuals on the various projects who are actually in need of assistance. A blanket moratorium is not only unnecessary but would deprive the bureau of revenue of about $5,000,000 a year, Dr. Mead stated. If the bureau were to forego this revenue for three years it would be obliged to postpone work on most of its projects.

Under Dr. Mead's plan, the secretary of the interior would be authorized at his discretion to defer the payments of individual water users until Dec. 1, 1936. In extending this relief, the interior department would determine the status of the applicant by requiring the submission of a statement of his liabilities and assets. In addition, the management of the project would be required to guarantee the payment of 6 per cent interest on the part of the individual accorded relief. No relief would be extended in any case except with the approval of the project. The position is taken by the Bureau of Reclamation that while there is some need for relief on some of the projects, this need is not universal. Reports from some projects indicate largely increased yields over those of last year.

Senator Wagner Advocates Big Public-Works Program

Although the federal employment stabilization act was intended primarily to provide relief in future periods of depression, Senator Wagner, of New York, author of the measure, believes that economic conditions have reached such a stage that the stabilization machinery should be put into operation immediately. He therefore proposes a two billion dollar public-works program to be undertaken by the federal government, the cost to be defrayed by a long-term bond issue.

The federal employment stabilization act became a law on Feb. 10, 1931. It provides for the appropriation of emer-

gency funds whenever the President finds upon the recommendation of the board that a period of business depression and unemployment is impending or is already in existence. Calling attention to the finding by the secretary of commerce last January that more than 6,000,000 persons were unemployed at that time, Senator Wagner takes the position that it is time to set in motion the relief machinery of the act.

Revision of Railway Rates to Affect Building Materials

Construction materials are affected rather extensively by the impending upward revision of railway rates. Commodities on which the surcharge has been converted from $3 per car to 6c. per ton include sand and gravel, broken, ground and crushed stone, furnace slag, crushed, ground or scrap slate, earth or soil. To this list has been added coated sand and coated rock, roadbuilding material that under the original classification would have been subject to an increase of 2c. per 100 lb.

On lumber, lath and shingles, posts, poles and piling, slate and cobblestones, formerly listed at $3 per car, a surcharge of 12c. per ton has been authorized. The surcharge on rough stone has been converted from $6 per car to 12c. per ton. Finished stone, artificial stone and asphalt, which also were included in the $6 per car classification, will instead pay a surcharge of 1c. per 100 lb. On mill work and tar the surcharge has been reduced from 2c. to 1c. per 100 lb. Cement, brick and building tile and lime will pay 1c. per 100 lb. as originally scheduled.

COSTS AND CONTRACTS

ENR Index Numbers

Cost				Volume	
Dec. 1, 1931		**166.23**	**Nov., 1931**		**180**
Nov. 1, 1931		169.28	Oct., 1931		229
Dec. 1, 1930		196.86	Nov., 1930		207
Average, 1930		202.85	Average, 1930		260
Average, 1929		207.02	Average, 1929		317
1913		100.00	1913		100

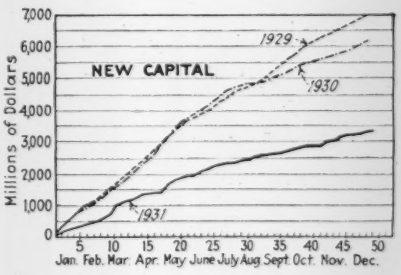
This Week's Contracts

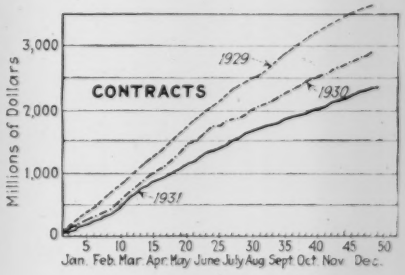
Heavy construction contracts, reported by *Engineering News-Record* in the week of Dec. 17, with some comparisons, total as follows:

(In Thousands of Dollars)

	Dec. 17, 1931	Average of Last Four Weeks 1931	1930
Buildings:			
Industrial	$2,973	$2,248	$2,880
Other	8,699	8,877	16,819
Streets and roads.	6,126	6,148	7,423
Other construction.	9,087	8,736	14,628
Total	$26,885	$26,009	$41,750

Total, all classes, Jan. 1 to Dec. 17:
1931 ..... $2,408,803
1930 3,140,596





Maryland's Road Program

Plans to spend about $2,800,000 on road work have been made by the Maryland state roads commission, according to Harry D. Williar, Jr., chief engineer. Work will be continued during the winter to provide additional employment. About 1,300 men will be employed on road construction in addition to about 1,700 engaged on maintenance and repair work.

Capital and Contracts

No private capital was issued for purposes of construction in the week ended Dec. 12. In this week, moreover, but $5,000,000 in public bonds were floated; in the preceding week a total of $19,000,000 included $16,000,000 in private issues.

The weekly average thus far amounts to $12,000,000, compared with $42,000,000 in November and $73,000,000 in December, 1930.

This year's cumulative total is $3,320,000,000, against $5,950,000,000 in the period Jan. 1 to Dec. 13, 1930.

SOCIETY CALENDAR

AMERICAN ROAD BUILDERS' ASSOCIATION, Washington, D. C.; annual convention and road show, Detroit, Mich., Jan. 9-15.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; annual meeting Jan. 19-22, New York City.

AMERICAN WOOD PRESERVERS' ASSOCIATION, Chicago; annual meeting, St. Louis, Jan. 26-29.

NATIONAL CRUSHED STONE ASSOCIATION, Washington, D. C.; fifteenth annual convention and exposition of quarry equipment and machinery and supplies, Pittsburgh, Pa., Jan. 19-22.

NATIONAL PAVING BRICK ASSOCIATION, Washington; annual meeting, Chicago, Feb. 10-12.

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington; annual meeting, Pittsburgh, Jan. 27-29.

ASSOCIATION OF PROFESSIONAL ENGINEERS OF BRITISH COLUMBIA at its annual meeting in Vancouver elected A. S. Gentles president and A. G. Langley vice-president.

BOSTON SOCIETY OF CIVIL ENGINEERS was addressed on economic conditions on Dec. 11 by Francis Lee Stuart, president of the American Society of Civil Engineers. Mr. Stuart said that international and domestic credit should be taken out of the fog of misunderstanding and made understandable to the public, and to accomplish this he believes that the government should give out data periodically bearing on the real credit situation in the country, just as weather reports are given out.

CAROLINAS BRANCH, Associated General Contractors of America, held its annual meeting Dec. 10-11 in Charlotte, N. C. Officers were elected as follows: president, William Muirhead, Durham, N. C.; vice-president, F. L. Shackelford, Greenville, S. C.; treasurer, Fred N. Thompson, Charlotte, N. C.; executive secretary, V. P. Loftis, Charlotte.

CITY AND COUNTY ENGINEERS' ASSOCIATION, Los Angeles, Calif., at its election on Dec. 4 chose as president John H. Allin, assistant city engineer-street superintendent, Pasadena. Other officers are: vice-president, Howard I. Stites, Burbank; secretary-treasurer, C. J. Shults, Los Angeles.

ENGINEERS CLUB OF CHATTANOOGA, Tenn., has elected the following officers: president, W. H. Wilson, city engineer; first vice-president, L. G. Haller; second vice-president, B. H. Martin; secretary, O. F. Reynolds (reelected); treasurer, J. A. Fairleigh.

INDIANA HIGHWAY CONSTRUCTORS, INC., at its eighth annual meeting in Indianapolis discussed the wisdom of extending the public-works program as a means of overcoming the unemployment problem. William Holland, secretary, said present economic conditions make public improvements better investments due to exceedingly low prices of materials. Among the speakers at the three-day meeting were: V. P. Ahearn, Washington, executive secretary of the National Sand and Gravel Association; W. L. Hempelmann, Chicago, engineer, Texas Co.; W. R. Sanborn, Kankakee, Ill., vice-president, National Crushed Stone Association; O. W. Irwin, Youngstown, Ohio, president, Concrete Reinforcing Steel Institute.

SANITARY GROUP, Los Angeles Section, American Society of Civil Engineers, has elected the following officers: president, R. F. Goudey; vice-president, Fred D. Bowlus; secretary, E. H. Clarkson.

Concrete Pavement Yardage

Below is given a tabulation of concrete pavement yardage awarded in the United States during the month of November, divided according to roads, streets and alleys, and the totals for the eleven months' period ended Nov. 28, 1931.

	During November	To Nov. 28
Roads	3,558,911	107,637,198
Streets	762,798	20,694,863
Alleys	39,531	791,621
Total	4,361,240	129,124,682

Obituary

EUGENE F. MUSSON, city engineer of Norwich, N. Y., in 1916, died on Dec. 9 at Kingsport, Tenn., following an illness of four years. Mr. Musson was 76 years old.

MONTGOMERY MEIGS, former United States civil engineer in charge of the Mississippi River work, died at his home in Keokuk, Iowa, on Dec. 9 at the age of 84. On his retirement in 1926, Mr. Meigs had completed 53 years' continuous service for the government, all of it devoted to improvements along the Mississippi. He was stationed at Keokuk from 1882 until his retirement.

Construction Equipment and Materials

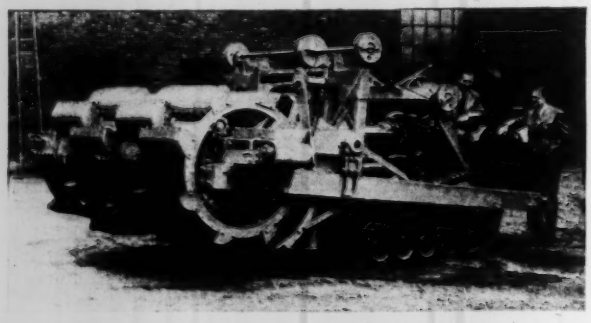
Multiple-Bucket Excavator for Accurate Shallow Grading

Production of a level and accurate grade when excavating to a depth of not more than 12 in. is the function of the Topping Shallo-Grader, a self-propelled, full power-operated traction excavating-grading machine developed by the Chas. T. Topping Co., 125 Lexington Ave., Aspinwall, Pittsburgh, Pa. The principal use of this machine is expected to be in highway construction, for reducing rough grades developed by shovels or graders to an accurately true sub-base on which to place forms and concrete slabs. However, it can also be used on other shallow grading operations. In one operation it will cut a path 8 ft. wide to within ¼ in. of the desired level. Capacity varies according to the depth of excavation and the soil characteristics; the maximum volume excavating capacity is about 75 cu.yd. per hour.

The Shallo-Grader is similar in operating principle to the wheel type of trenching machine, but differs in that the excavating unit is mounted in front of the crawler treads, being supported by two heavy side arms pivoted at the rear end of the tractor. The traction crawlers, therefore, operate all times on a smooth surface. The bucket wheel is provided with 32 excavator buckets mounted, in four series, on heavy steel ring gears. These buckets have sharp teeth cast on their cutting edges and are staggered. Each tooth point is hard surfaced to resist abrasion. The staggered arrangement of the buckets produces a milling action, making it possible for the machine to excavate any material or road surface that can be broken with a pick or scarifier, provided the cut extends below the base of this pavement. Gravel and stone not exceeding 3 in. in diameter can be handled. The excavating unit is hoisted or lowered by power, and can also be tilted sideways to cut grades of various contours. An adjustable safety friction release clutch gives positive protection should the bucket encounter large stones or other immovable objects.

The Shallo-Grader is mounted upon a standard model 20 or 30 McCormick-Deering industrial tractor fitted with Trackson crawlers. Power is transmitted to the excavating wheel through a reduction transmission that gives the operator a choice of four excavating speeds varying from 73 to 445 lin.ft. per hour. Normal road traction speeds, four in number, have a maximum of 3.8 m.p.h. Excavated material is dropped from the buckets to a conveyor belt which discharges it in a windrow on either side of the machine. If desired, a second conveyor can be attached for direct loading into trucks.

Materials used in the construction of the machine are of the highest quality. Practically all castings are of high-carbon steel; shafts are nickel steel revolving in either ball or roller bearings; gears and sprockets have cut teeth; are of hardened steel, and in most cases operate in oil-tight cases. Conveyor rollers revolve on ball bearings. Excavator buckets are of high-carbon cast steel, hardened. No bronze or babbitted bearings are used. All clutches are of the friction type.



Self-propelled grading machine for shallow cuts

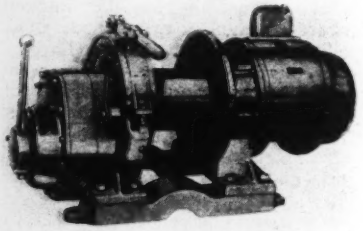
Three-Way Dump Wagons

Improvements in the 8-cu.yd. three-way dump wagons produced by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, include substitution of a two-stage hydraulic jack for the former three-stage jack; a new jack swivel base casting; stronger bodies and doors; and an improved and heavier locking mechanism. This body has a water level capacity of 7 cu.yd., a heaped capacity of 10 cu.yd. and a weight of 17,740 lb. It is mounted on crawler tractors and will dump to either side or to the rear.

Small Electric Hoists

By substituting an electric motor and a friction clutch for the air motor and jaw clutch used on its Utility hoist, the Ingersoll-Rand Co., 11 Broadway, New York City, has produced a non-reversible, single-drum electric hoist with many applications in the mining, contracting and industrial fields. Two models are available, equipped with either 7½- or 10-hp. motors for alternating or direct current. Either of these units can be fitted with drums to take 400 ft. of ½-in. or 700 ft. of ⅜-in. cable, for the smaller, or 800 ft. of ½-in. or 1,400 ft. of ⅜-in. cable for the larger. Self-energizing brakes are used for stopping and holding the load and an automatic safety drum lock for holding suspended loads. Moving parts are protected by dustproof construction. Bases are drilled and grooved for either column mounting or bolting to a flat surface.

The company has also added two new sizes to its line of electric double-drum hoists for slushing service in metal and coal mines, and for general scraping and dragline operation in industrial fields. Model 207, of 7½ hp., will give 2,000 lb. rope pull at 125 ft. per minute; model 201, with a 10-hp. motor, will give the same rope pull at 165 ft. per minute. The cable capacity of both drums is 475 ft. of ⅜-in. or 275 ft. of ½-in. cable. Alternating or direct current motors are available. Construction features include fully inclosed construction; brake lock; two-clutch, balanced drum drive with single lever safety control; inclosed gear chamber with helical gears operating in a bath of oil; foot-controlled brakes; adjustable, case-hardened cable rollers on Timken bearings; and steel skid mountings.



Portable electric hoist

Bin Gate With Remote Control

An automatic dump gate that can be opened and closed by an electric push release switch has been developed by the Stephens-Adamson Mfg. Co., Aurora, Ill. The gate was designed primarily for emptying batch weight hoppers in ready-mixed concrete plants, but it can be used wherever the entire load in a bin or hopper is to be dumped by remote control. Essential parts consist of a throat casting, a counterweighted valve plate to close the opening and two latch mechanisms operated by a General Electric "Thrustor." The valve plate is held closed by the front latch. Upon pressing the operating button, the Thrustor opens the latch and, with the weight of the load, opens the valve. The valve plate remains open until the operating button is again pushed, when the rear latch is opened by the Thrustor and the counterweight on the valve casting forces it up into closed position.

This gate is made for openings from 12x12 to 18x24 in. and can be operated by a push release switch from a control panel at any distance.

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	Project	Cost	Status
Streets and Roads			
Missouri	Roads and bridges	$1,707,119	Contract
Bridges			
Massachusetts	Bridge	$2,921,700	Proposed
Sports and Parks			
Farmingdale (N. Y.)	Park and Golf Course	$1,000,000	Proposed
Power and Lighting			
Evanston (Ill.)	Street Lighting System	$1,025,000	Contract
Federal Government			
Montgomery (Ala.)	Post Office	$1,000,000	Bids asked
Portland (Ore.)	Federal bldg. and Court House	$1,156,000	Contract
Factories and Mills			
Ontario	Gas and Coke Plant	$1,000,000	Proposed
Warehouses			
Saugus (Mass.)	Bulk Oil Plant	$1,000,000	Proposed
Buildings			
New York	Residential	$50,000,000	Proposed
Boston	State Office	$1,199,489	Contract
Brooklyn	School	$2,500,000	Proposed
New York	Schools	$6,900,000	Proposed
Philadelphia	Schools	1,000,000	Proposed
Los Angeles	Telephone Exchange	1,100,000	Proposed
Newark (N. J.)	Railroad Station	12,000,000	Proposed

WATERWORKS

PROPOSED WORK

Ill., Collinsville — Preliminary plans waterworks improvements, incl. new deep well, 900 to 1,000 g.p.m. electric driven pump, well and pump house, 500,000 gal. rein.-con. reservoir, 14 in. c.i. suction main, pumping equipment in old boiler room, reconstructing boiler room, 20 c.i. force main in various distribution mains inside city limits. $168,000. Kinsey Eng. Co., Marshall Bank Bldg., Pekin, engrs.

Ia., Mason City—Preliminary plans tank on tower, watermains, hydrants. $68,000.

Ia., Princeton—City Council issuing $35,000, remodeling, improving waterworks.

Ia., Spencer—City Council new waterworks, drilling 10 wells, erecting pumping station. To exceed $25,000.

Kan., Anthony—See "Power Plants."

Mass., Weymouth — Town, Bd. Selectmen, water tower at Edison Plant, North Weymouth. $27,000 appropriated.

Minn., Duluth—City Council enlarging, remodeling Lakewood Pumping Station, incl. boilers, low head pumps, replacing pipes. $120,000. E. W. Kelley, engr. Water Dpt.

Minn., St. Louis Park—Village, H. Carlton, clk., water tank on tower, artesian water supply system. $20,000 election soon for same. Alexander & Bradley, 410 New York Life Bldg., Minneapolis, engrs.

N. J., Orange—Bd. City Comrs., City Hall, rejected bids Sept. 1, water pumping and lighting plant, at Chestnut St. $435,000. Runyon & Carey, 31 Fulton St., Newark, engrs. Project may be abandoned. Noted Aug. 27.

Tenn., Cookeville—Soon takes bids 500,000 g.p.d. purification plant complete. $30,000. V. V. Long & Co., 1300 Colcord Bldg., Oklahoma City, Okla., engrs.

Va., Blacksburg — Town, F. W. Earhart, mayor, waterworks extensions, incl. 4 mi. pipe line, 2,500 g.p.m. pumping plant, elevated steel tank. $85,000. **Maturity in early spring.**

Ont., Carleton Place—City Council new 6 in. c.i. mains, valves, hydrants, connections. $20,000. M. W. Rogers, Carleton Place, engr.

Ont., Chatham—City, waterworks extensions and construction, incl. 6 in. c.i. mains, hydrants, valves, connections. $48,000. T. M. S. Kingston, City Hall, engr.

Ont., Oshawa—Valves, hydrants, 8,535 ft. 4 and 8 in. c.i. mains in Wilson and Kingston Rds. $29,000. F. B. Goedike, City Hall, engr.

BIDS ASKED

Conn., Shelton — Dec. 21, by State Water Comm., State Office Bldg., Hartford, furnishing 100,000 gal. elevated hemispherical bottom, steel water tank cross-connections, installing 250 ft. 6 in. wrought iron pipe, valves, fittings, accessories at Laurel Heights Sanatorium. H. Van Zelm, 11 Asylum St., Hartford, engr.

Ill., Millstadt—Bids about Feb. 9, water distribution system, incl. 25,000 ft. 4-to 8-in. mains, valves, boxes, hydrants. $40,000. Russell & Axon, Roosevelt Bldg., 4903 Delmar Blvd., St. Louis, Mo., engrs.

N. Y., Long Island City—Dec. 22, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Grand Central Parkway, Rau Court, 1st and 173rd Sts.

Pa., Lancaster—Dec. 30, by T. W. Metzger, mayor, City Hall, rapid sand filtration plant, raising dam, screen house, creek crossings, lining and covering clear water reservoir and other waterworks improvements. J. N. Chester Eng.-neers, 717 Liberty Ave., Pittsburgh, engrs.

Wis., Madison—Dec. 28, by A. W. Bayley, secy. Bd. Control, equipment for lime soda ash water softener plant, incl. piping, fittings, valves, agitators, dry feeders, sludge pumps, operating tables, rate of flow control, loss of head gages, deep well, turbine pumps, filter sand and gravel, at Industrial School for Girls, Oregon. W. G. Kirchoffer, 22 North Carroll St., consult. engr.

Ont., Belleville—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Agnew—State Dpt. P. Wks., Division Architecture, Sacramento, water tower, rein.-con. found., 100,000 gal. steel tank, to J. F. Shepard, 1st Natl. Bank Bldg., Stockton, $22,-900. Noted Nov. 5.

Calif., Beverly Hills—City Council, rein.-con. slab for roof for reservoir on La Cienega Blvd., to F. F. Greenfield Co., 7310 South Figueroa St., Los Angeles, $49,200.

Calif., Los Angeles—See "Streets and Roads."

Kan., Topeka—Distribution system extensions, incl. 15,487 ft. 6 and 8 in. c.i. mains, 8,475 lb. fittings, forty 6 in. and two 8 in. valves and boxes, two 2 in. hub valves, 20 hydrants, 55 sq.yd. asphaltic concrete and concrete paving, to Thompson & Schooley, 2503 North 12th St., Kansas City, $18,966.

N. Y., Long Island City—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, pressure filters, etc., at Fresh Pond Lane and Underhill Ave., to Bronx Water Wks., 1 Riverdale Ave., New York, $54,900. Noted Nov. 26.

N. Y., New York—J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains, to Sareno Contg. Co., 1957 Colden Ave., $13,913. Noted Nov. 26.

O., Ashland—For 2 m.g. elevated storage tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill., $25,945. Est. $25,000-$30,000. Noted Oct. 29.

Ont., Belleville—For 6,000 lin. ft. 18 in. c.i. auxiliary pipe line from reservoir to city, day labor; special castings, to National Iron Corp., foot of Cherry St., Toronto, $1,622; valves and hydrants, to Drummond McCall Co. Ltd., 373 Front St. E., Toronto, $792 and $1,523 respectively; meters, to E. Dean Wilkes, 18 Toronto St., Toronto, $1,735. Contract for furnishing pipe published Dec. 3 issue. Total est. $65,000. C. A. Mott, City Hall, engr.

SEWERS

PROPOSED WORK

Ill., Elmhurst—Sanitary sewers. To exceed $25,000. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., engrs.

Ind., Berne—Town Council sewage disposal plant, $35,000. C. Bressman, 1002 Chamber of Commerce Bldg., Indianapolis, engr. Noted Mar. 12.

Ia., Ashton—Sewage disposal plant, auxiliary piping. **Maturity in spring.** W. E. Buell & Co., 501 Insurance Exch. Bldg., Sioux City, engrs.

Ia., Newton—Preliminary plans remodeling sewage disposal plant, incl. new trickling filter, 2 sandbed filters changed to trickling filters. $60,000.

Ia., Spencer—City Council, sewerage treating plant. $100,000.

Mich., River Rouge—City instructed M. L. Brown & Sons, engrs., 120 Madison Ave., Detroit, to prepare plans, estimates for completion sewerage system, incl. concrete adn vitr. pipe, manholes, connections. $248,000.

Mo., St. Louis—City preliminary plans repairing and maintenance work to River Des Peres Drainage System, incl. repairing landslide damage near Morganford Rd. and Arsenal St., ditching out water pools. $68,720. W. W. Horner, city engr.

O., Shelby — Surveys sanitary trunk sewer, sewage disposal plant. $150,000. F. Brown, Marion, sanitary engr. Noted Nov. 26.

Okla., Oklahoma City — Preliminary plans sanitary relief sewer in 12 blocks Pennsylvania St. $26,000. A. R. Losh, City Hall, engr.

Va., Newcastle — Town, E. A. Hoffman, mayor, private parties having preliminary plans made by state engineers, sewerage system, sewage disposal plant. $100,000. **Maturity in spring.**

Ont., Dundas—Preparing plants storm sewers, $40,000. E. H. Darling, 36 James St. S. Hamilton, engr. Noted Sept. 24.

Ont., Fort William—Bids early in January, sewage screening plant, 9,000 lin.ft. intercepting sewer. $150,000. Wynne Robert-Son & McLean, 1311 Metropolitan Bldg., Toronto, engrs.

Ont., Niagara Falls—City Council, 10- to 18-in. vitr. tile or concrete sewers in Front, Gate, Simcoe and Prideaux Sts. $25,000. F. N. Rutherford, Niagara Falls, engr.

Ont., Sault Ste. Marie—For 8 in. and up vitr. tile storm sewers in Harris-Buckley area. $155,400. A. H. Russell, City Hall, engr.

Ont., Timiskaming—Tock Twp. sewer construction. $30,000. Work may be done by day labor.

Ont., Welland—Crowland Twp., sewerage system, incl. vitr. tile pipe, catchbasins, manholes, connections, in Industrial Park and Maple Leaf Park Areas. $100,000. Ross & Scott, Welland, engrs.

Que., Bagotville—Town Council soon takes bids sewers. $49,000.

BIDS ASKED

N. Y., Brooklyn—Dec. 23, by H. Hesterberg, pres., Brooklyn Boro. Boro Hall, sewers in Delamere Pl., Rockaway Parkway, Avenue J, Rockaway and Ditmas Aves., East 94th, Bristol, East 48th Sts.

See proposal advertising on page 58

Constr. News page 217

LEADITE

Trade Mark Registered U.S. Pat. Office

Part of a 20" c.i. water main 9 Miles long

laid across very rough country —and "all joints" made with LEADITE

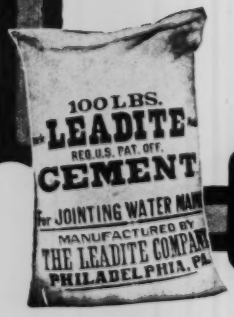
RELIABILITY is a word synonymous with LEADITE—and has been for over a quarter century.

When water lines such as that shown above are laid—"no chances can be taken" with the jointing material—the joints must be as tight as possible, and they must stay tight under stress and strain.

Water Works Men, Engineers and Contractors specify and use LEADITE, because they know from experience that it is RELIABLE.

The pioneer self-caulking material for c.i. pipe
Tested and used for over 30 years.
Saves at least 75%

THE LEADITE COMPANY
Land Title Building **Philadelphia, Pa.**



No Caulking

Sewers (Continued)

Wis., Madison — Dec. 28, by A. W. Bayley, secy. Bd. Control, sewage disposal plant incl. piping, fitting, valves, blower and filtros plates or alternate mechanical devices, rotary screen, sludge pumps, clarifier, mechanism, at Industrial School for Girls, Oregon. W. G. Kirchoffer, 22 North Carroll St., consult. engr.

CONTRACTS AWARDED

Calif., Los Angeles—See "Streets and Roads."

Calif., Los Angeles—Bd. P. Wks., City Hall, 11,500 ft. 8 in. sewer in Manning Ave. and La Conte Ave. Sewer Dist., incl. 32 manholes, 4 junction chambers, 10 flushing manholes, 1 slushing structure, 6 lampholes, 280 lin.ft. rein.-con., 8,182 lin.ft. house connection sewers, 36,843 sq.ft. resurfacing, to S. Pizula, 3325 Floral Dr., $20,953. Est. exceeds $25,000.

Ill., Galesburg—Bd. Trustees Galesburg Sanitary Dist., 15 Weinberg Arcade, A. O. Lindstrom, pres., completing Contr. D, Cedar Fork Impvt. Cedar Fork Channel Intereceptor Sewer, incl. 5 bridges, to Alexander Repass Bros., Security Bldg., Des Moines, Ia., $144,900. Est. $267,472. Original contract, incl. 20,000 ft. channel improvement, 400 ft. relocating and 18,000 ft. 24- to 48-in. interceptor was abandoned by contractor when 75% completed. Noted Nov. 2.

Ill., Vandalia—State Farm, c/o Div. Architecture & Eng., Springfield, brick, stone sewage treatment plant, equipment, to Gjellfald Constr. Co., 266 Indiana Ave., Elmhurst, $17,393.

Ia., Bettendorf—City Council, 28th Street Sanitary Sewer, to D. E. Keeler Co., Davenport, $21,872.

Ia., Burlington—R. Schlamp, city clk., New Cascade Sewer, Sect. 1, incl. 2,075 ft. 8 x 6 ft. rein.-con. box sewer, 2,360 cu.yd. earth and 250 cu.yd. rock excav., connections, to F. W. Guenther, Burlington, $38,096; Sect. 2, incl. 1,695 ft. 6 x 5 ft. rein.-con. box sewer, 2,985 cu.yd. earth and 575 cu.yd. rock excav., connections, to H. G. Vollmer, Burlington, $19,230; Sect. 3, 6,445 ft. 8- to 36-in. concrete or vitr. clay sewer pipe with concrete mortar joints, manholes, connections, to Gjellefald Constr. Co., Forrest City, $37,388. Grand total $94,713.

Mass., Boston — Commonwealth of Massachusetts, Metropolitan Dist. Comn., 20 Somerset St., section New Neponset Valley Sewer, South Metropolitan System, Canton, to A. Baruffaldi, 52 Powder House Blvd., Somerville, $52,500. Noted Dec. 3, under "Contracts Awarded."

Mich., Grand Rapids—City Comn., concrete concrete pipe and vitrified pipe sewers in Broadway Ave., between Webster and Richmond Sts., under direct supervision G. W. Welsh, city mgr., without awarding contracts. $290,000.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to Vaccaro D. LaSalla, 216 1st Ave., New York, sewers in Marine Parkway $4,405, Lott Pl. $1,238, 70th St. $1,472. Grand total $7,115. Noted Nov. 19.

O., Cleveland—For 3,227 ft. 8 x 12 ft. double barrel, rein.-con. culvert, Nine Mile Creek from St. Clair Ave. to East 152nd St., to Hecker-Moon Co., 8701 Union Ave., $305,595. Noted Sept. 17.

Va., Newport News—City council, 2,200 ft. sewer from Marshall St. to Salters Creek to Hampton Rds., to Virginia Eng. Co., Newport News, $61,147. Noted Oct. 29.

W. Va., Parkersburg — City Council, G. Huber, supt. Dpt. Waterworks & Sewers, Sanitary Sewerage System, Sanitary Dist. 2, incl. furnishing, laying 33,600 lin.ft. 6- to 10-in. vitr. sewer pipe and specials, 6,975 lin.ft. 12- to 16-in. c.i. sewer pipe, manholes, to J. D. Greenwade, Huntington, $65,925. Noted Nov. 5.

WASTE DISPOSAL

PROPOSED WORK

Mass., Holyoke—City, W. T. Dillon, mayor, preparing plans incinerator plant. $75,000. P. E. Bond, city engr.

BIDS ASKED

Ore., Portland — Dec. 30, by City Comrs., garbage incinerator. $300,000. O. Laurgard, city engr. Noted Dec. 3.

BRIDGES

PROPOSED WORK

Fla., Miami—City Council plans protection to bridge foundations, approaches, incl. addition to bridge spans or narrowing river at bridges and protection to foundations, necessitating considerable piling during dredging, widening and deepening Miami River. Address city engineer.

Kan., Kansas City—City, H. Payne, clk., soon takes bids three 40 ft. span steel bridge over Jersey Creek at 8th St. $25,000. C. E. Peterson, City Hall, engr. Noted Sept. 3.

Massachusetts — Commonwealth of Massachusetts, Dpt. P. Wks., A. W. Dean, engr., State House, Boston, new bridge over Merrimac River between Newburyport and Salisbury, $2,921,700.

R. I., Providence—Rein.-con. bridge, Bath St. and Quinsey Ave. $25,000 or more. S. F. Nolan, City Hall, engr.

Ont., Oshawa—City Council 150 ft. bridge, probably concrete, over Oshawa Creek. $35,000. F. B. Goodike, City Offices, engr.

Ont., Toronto—For 500 ft. structural steel beam and girder bridge, 86 ft. wide, concrete abutments, piers, retaining walls, floors, etc., at Pears Ave., in connection with proposed extension of Bay St. to St. Clair Ave. $350,000. R. C. Harris, City Hall, engr.

BIDS ASKED

Calif., San Francisco—Dec. 23, by C. H. Purcell, ch. engr. San Francisco-Oakland Bay Bridge, 500 Sansome St., investigation of bridge foundation sites at San Francisco-Oakland Bay Bridge on Yerba Buena Island, boring cased holes and diamond drilling through bedrock, taking samples of material encountered for investigation, 2,400 lin. ft. diamond drilling through bedrock, 100 lin. ft. cased holes from ground line to bedrock. Noted Dec. 10.

Calif., Ukiah—Dec. 23, by C. H. Purcell, engr. State Hy. Comn., Sacramento, bridge to have 100 ft. steel pony truss span on concrete piers, fourteen 19 ft. timber approach spans on redwood pile bents, oil and screenings and 0.3 mi. gravel roadway over Russian River, 3.5 mi. northeast of here, Mendocino Co.

Ga., Atlanta — Dec. 31, at office City Purchasing Agent, reconstructing 90 ft. bridge of Whitehall St. Viaduct, incl. removing present bridge, reconstructing steel beam bridge with rein.-con. slab, railings, brick panels, concrete piers and founds., pavements, drains, electrical work, etc. F. E. Kauffman, engr. of bridges.

Illinois—Dec. 21, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, two 39 ft. and one 45 ft. span rein.-con. girder bridge, Route 5, Sect. 7-H Cook Co.—three 6 x 7½ ft. rein.-con. pedestrian subways, Route 54, Sect. 542-H—seven 47 ft. span rein.-con. girder bridge, Route 54, Sect. 543-H—two 40 ft., two 44 ft. and two 35 ft. span steel I-beam bridge, Route 54, Sect. 544-V-B, all DuPage Co.—three 63 ft. span rein.-con. girder bridge, Route 62, Sect. 117-B Cook Co.—two 42 ft., one 35 ft., one 50 ft. and one 40 ft. span rein.-con. girder bridge, Route 74, Sect. 102-V-B, Stephenson Co. — rein.-con. substructure, Route 80, Sect. 103-B-1—one 58 ft. and one 100 ft. span steel superstructure, Route 80, Sect. 103-C-1, both Jo-Daviess Co.—rein.-con. substructure and steel superstructure, Route 94, Sects. 111-B and C, Henderson Co. — three 35 ft. span rein.-con. girder bridge Route 104, Sect. 140-B, Sangamon Co.—rein.-con. grider bridge, rein.-con. substructure, two 30 ft. rein.-con. approach spans, Route 104, Sect. 142-B—steel superstructure, Route 104, Sect. 142-C both Christian and Sangamon Counties—four 50 ft. and four 45 ft. span rein.-con. girder bridge, rein.-con. substructure, 4 rein.-con. girder approach spans, Route 133, Sect. 122-B—steel superstructure, Route 133, Sect. 122-C, Douglas, Coles and Edgar Counties—one 50 ft., two 35 ft. and one 45 ft. span rein.-con. girder bridge, three 15 ft. and one 12 ft. span steel I-beam bridge, rein.-con. culvert, 2 rein.-con. substructures, Route 143, Sect. 105-B—one 150 ft. and one 100 ft. span steel superstructure, Route 143, Sect. 105-C, both Saline Co. F. T. Sheets, hy. engr.

Maryland—Dec. 22, by State Roads Comn., G. T. Uhl, chn., Baltimore, triple span concrete arch bridge over Sligo Branch, on Carroll Ave., Takoma Park. Contr. M-199-37, Montgomery Co.; adv. E. N.-R. Dec. 17.

Mississippi—See "Streets and Roads."

Minn., Grand Rapids—Dec. 22, by State Hy. Dpt., St. Paul, constructing Bridge 5168, S. P. 8-27, southeast of here. $25,000.

New Jersey—Dec. 28, by State Hy. Comn., Trenton, bridge to carry Route 35 over Freehold and Jamesburg R.R., near Manasquan, Monmouth Co.; constructing Route 37, Sect. 6, Back Creek Bridge, approaches, at Lakeside, Mercer Co.; adv. E.N.-R. Dec. 17. A. L. Grover, ch. clk.

N. J., Trenton—Dec. 29, by Bd. Freeholders Mercer Co., Court House, 8 span concrete, steel girder bridge over Assunpink Creek and Pennsylvania R.R. at Chamber St. $200,000. Railroad to share part expense. H. F. Harris, Court House, co. engr.

CONTRACTS AWARDED

Florida—State Road Dpt., Tallahassee, R. M. Duncan, hy. engr., 4 bridges over Nassau River, Rd. 3, Project 57, Nassau and Duval Counties, to C. G. Kershaw Contg. Co., Woodward Bldg., Birmingham, Ala., $128,305. Noted Nov. 26.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, to F. Hillquist, Geneva, bridges on Route 71, Sect. 115-B, Lee Co., $7,784—to Clinton Bridge Wks., Clinton, Ia., Route 97, Sect. 142-B, Fulton Co. $39,187—to M. J. McDermott Co., Chicago, Route 46, Sect. 462-VB, Cook Co. $104,004—to Parham Constr. Co., East St. Louis Route 11, Sect. 47-B $9,180; Route 4, Sect. 66-B $7,197; Route 4, Sect. 65 $8,552, all Madison Co.—to H. V. Rupp, Mt. Carmel, Route 146, Sect. 111-VB, Johnson Co., $2,343—to States Impvt. Co., 160 North La Salle St., Chicago, Route 22, Sect. 23-RB, Cook Co. $7,055—to S. Urech, Chicago, Route 5, Sect. 7-YV, Cook Co. $14,419. Grand total $199,721. This corrects report in Dec. 3 issue.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, bridges on Route 104, Sect. 141-B and C, Sangamon Co., to Clinton Bridge Wks., Clinton, Ia., $4,100 and $5,700 respectively—Route 80, Sect. 102-B, Jo Daviess Co., to A. R. Coffeen, Decorah, Ia., $9,855—Route 150, Sect. 136-B-1, Alexander Co., to S. J. Cohen Co., Blytheville, Ark., $41,168—Route 89, Sect. 126-B, Kendall Co., to Hartman-Clark Bros., 920 Peoria Life Insurance Bldg., Peoria, $10,234—Route 121, Sect. 103-B, Tazewell Co., to J. L. Simmons Co., Bloomington, $68,895—Route 146, Sect. 104-C, Union Co., to Pan American Bridge Co., New Castle, Ind., $6,446—Route 146, Sect. 104-B, Union Co., to Parham Constr. Co., East St. Louis, $19,239—Route 121, Sect. 103-C, Tazewell Co., to Wisconsin Bridge & Iron Co., 5023 35th St., Milwaukee, Wis., $206,567. Grand total $372,204. Rejected bids bridge on Route 124, Sect. 101-B, Sangamon Co. Noted Oct. 29.

Ill., Galesburg—See "Sewers."

Iowa—State Hy. Comn., Ames, three 50 x 24 ft. span I-beam bridge, Buchanan Co., to Waugh & Tackman, Clarksville, $10,497—high truss bridge with one I-beam and two approach spans, Guthrie Co., to Ben Cole & Son, Ames, $23,471—43 culverts, Guthrie Co., to Kelley & Overman, Villisca, $24,747—I-beam bridge, 2 high truss bridges with approaches, also 4 culverts, Kossuth Co., to Eno & Montgomery, Rockwell City, $37,019—one 140 x 20 ft. high truss bridge with two 40 x 20 ft. I-beam approaches, Kossuth Co., to C. J. Krumme Co., Ft. Dodge, $16,268. Grand total $112,002. Noted Dec. 3.

Maryland—State Roads Comn., Baltimore, G. C. Uhl, chn., substructure, superstructure (with exception structural steel span over railroad tracks) approaches, etc., for proposed grade elimination over relocated tracks Pennsylvania R.R., Contr. Co-77-23, Cecil Co., to Henry L. Maas & Son, 119 Ensor St., Baltimore, $90,015—removal rein.-con. viaduct over Sligo Branch on Carroll Ave., Contr. M-197-37, Montgomery Co., to Forbes-Murphy Contg. Co., 327 St. Paul St., Baltimore, $2,000—fabrication and erection structural steel girder span for proposed grade elimination over relocated tracks Pennsylvania R.R., Contr. Co-123-23, Cecil Co., to Phoenix Bridge Co., Phoenixville, Pa., $8,855. Grand total $100,870. Noted Nov. 26.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, double span concrete slab bridge on Glenmont-Colesville Rd. over northwest branch, Contr. M-180-37, Montgomery Co., to J. S. Bowers, Whiteville, N. C., $7,615. Noted Sept. 24.

Michigan—A. L. Burridge, div. engr., Cadillac, MBr. 1 of 57-3-2C1 and 2, Missaukee Co., Contr. 1, to Elkhart Bridge & Iron Co., Elkhart, Ind. $2,190, Contr. 2, to H. J. Davies, Escanaba, $11,531; FBr. 1 of 6-12-21, Contr. 1, substructure 2 rein.-con. and abutments buttress type, 27 ft. 10 in. height, from bottom of footings to crown of roadway, Arenac Co., to J. W. Hertel, Grand Rapids, $11,454 for State Hy. Dpt., Lansing. Grand total $25,175. Noted Nov. 5.

Michigan—J. T. Sharpensteen, div. engr., Escanaba, FBr. 1 of 55-10-12, Menominee Co., for State Hy. Comn., Lansing, Contr. 1, to Whitehead & Kales Co., Detroit, $1,762; Contr. 2, to C. G. Bridges, Escanaba, $10,446. Noted Nov. 5.

Michigan—W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, M-BR 1 of 78.9 6 two 35 ft. spans, rein.-con. abutments semi-gravity type, steel deck girder with rein.-con. floor, 30 ft. roadway, two 2½ ft. sidewalk, St. Joseph Co., for State Hy. Comn., Lansing, Contr. 1, to Elkhart Bridge & Iron Co., Elkhart, Ind., $1,539. Contr. 2, to H. E. Stroh, Hillsdale, $10,807. Noted Nov. 19.

Michigan—H. G. Oakes, div. engr., Plymouth, FBI of 23-5-4, Eaton Co., for State Hy. Dpt., Lansing. Contr. 1, to American Bridge Co., 1328 Buhl Bldg., Detroit, $1,906; Contr. 2, to Frank & Stiehl, East Lansing, $11,866. Noted Oct. 15.

Minnesota—State Hy. Dpt., St. Paul, Bridges 5177 and 5178, Koochiching Co., to T. Jenson, St. Cloud, $42,890 and $63,480 respectively—Bridges 5175 and 5181, Big Stone Co., to Teberg & Berg, 1707 Standford Ave., St. Paul, $21,840—Bridge 4750, at New Ulm, to Nolan Bros. & Erler, 18 North 2nd St., Minneapolis, $69,693. Grand total $197,903. Noted Nov. 19.

Missouri — State Hy. Bd., Jefferson City, to Maxwell Constr. Co., Columbus, Kan., bridges over Holts Creek, Dent Co., $4,330; over Woods Fork Gasconade River, Wright Co. $22,785—to F. T. O'Dell, Hannibal, over Hurricane Creek, $6,041; over branch $1,142; over branch $919; all foregoing Ripley Co.; over branch Miller Co. $745; over Enon Branch, Moniteau Co. $777; over Flat River, St. Francois Co., $7,288, over St. Louis, San Francisco R.R., $28,114, over pedestrian underpass, $2,155, both St. Louis Co.—to C. F. Lytle, 504 Nebraska Bldg., Sioux City, Ia., over Scour Creek, $5,350, over Drainage Ditch $7,527; over overflow $6,283 over overflow $6,275; over Wahoo Branch $2,367; over Missouri Pacific R.R. $15,058, over Fire Prairie Creek D.D. $19,153; over Fire Prairie Creek $10,180; over Fire Prairie Creek $9,733; over Kansas City Southern R.R. Co., 999; over Little Blue River $18,774, over Missouri Pacific R.R. $19,296, all foregoing Jackson Co.—to M. Wunderlich, Jefferson City, over Little Bourbouse River, Crawford Co., $4,491; over Little Tarkio Creek $10,394; over stream $2,690, both Atchison Co. — to Lahar Bros., Boonville, over Lateral Ditch 3, Dist. 29 $2,133 over slough $2,716; over overflow $1,296; over Lateral Ditch 1, Dist. 29 $2,700; over Lateral Ditch 1, $1,292; over Main Ditch Dist. 29 $2,860; over D.D. 14, Dist. 29 $1,835, all foregoing New Madrid Co.; over D.D. 11, Butler Co. $6,395; over D.D. 4, Dunklin Co. $2,213—to O. W. Knutson, 3520 Main St., Kansas City, over Mussel Fork Creek, $16,675; over Mussel Fork Overflow, $12,203; over Cotton Wood Creek, $7,057; all foregoing Chariton Co.; over old channel, Grand River, $6,376; over ditch $2,022; over ditch $1,343; over branch $2,418 over Panther Creek $3,350; over ditch $1,333, all foregoing Harrison Co.; over drain $775; over Muncas Creek $3,041; over Middle Fork Chariton River $3,822, all foregoing Randolph Co.—to Ebbe Constr. Co., Trenton, over No Creek Overflow $10,839; over No Creek $11,700; over O. K. Creek $1,577; over stream $3,802; over West Medicine Creek $20,049, all foregoing Grundy Co.—to Hoover Bros. Constr. Co., 1500 East 18th St., Kansas City, over Pole Cat Creek, Livingston Co. $2,128—to Henderson Constr. Co., Kansas City, over First Creek, Clay Co. $9,368—to Graham Bros. Constr. Co., 2515 East 37th St., Kansas City, over Honey Creek, Lawrence Co. $15,193—to C. K. Kost, Joplin, over West Fork Spring River, Barton Co. $5,193—to Gaines Bros., Eldon, over Cat Tail Creek, Miller Co. $1,541—to Samples & Elsea, Kirksville, over Buck Run, Clark Co. $1,931—to S. J. Cohen & Co., Blytheville, Ark., over Headwater Diversion Channel, Cape Girardeau Co. $80,880. Grand total $477,254.

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Bridges (Continued)

New Jersey — State Hy. Comn., Trenton, bridge over Raritan River, Middlesex Co., to Turnbull Constr. Co., Eatontown, $24,882. Noted Nov. 12.

N. J., Phalanx—Monmouth Co., Court House, Freehold, reconstructing Bridge A-53, on Phalanx Atlantic Highlands Rd., to Thomas Proctor Co., Inc., 218 North 5th Ave., Long Branch. Est. $25,000. Noted Nov. 13.

Ohio—O. W. Merrell, dir. hys., Columbus, two 40 ft. span, concrete beam bridge, 44 ft. roadway, two 5 ft. sidewalks, Summit Co., to C. A. Heyl, Barberton, $20,378—three 32 ft. span creosoted timber bridge with steel stringers, 24 ft. roadway, Holmes Co., to Wertz Co., Schofield Bldg., Cleveland, $6,535—two 30 ft. span, concrete beam bridge, 24 ft. roadway, two 3 ft sidewalks, Vinton Co., to L. J. Kuhner, Jackson, $9,040. Grand total $35,953. Noted Nov. 19.

Ohio—O. W. Merrell, dir. hys., Columbus, to Ray Strawser, Inc., 852 North Cassady Ave., Columbus, two 40 ft. span concrete beam bridge, over Raccoon Creek, Sect. "F" Lancaster-New Lexington Rd., $14,103; two 40 ft. span concrete beam bridge over Clear Creek, Sect. "M-2" Cincinnati-Zanesville Rd., $9,046, both in Fairfield Co.; 45 ft. span concrete beam bridge over Sunday Creek, Perry Co., $10,547—to C. T. Ross, Greenville, 40 ft. span concrete beam bridge, Darke Co., $6,529, all foregoing 24 ft. roadway—to J. and E. Williams, Washington Court House, two 42.5 ft. span concrete beam bridge, 40 ft. roadway, over Paint Creek, Fayette Co., $14,416—to Frost Constr. Co., Findlay, 36 ft. span, concrete beam bridge, 24 ft. roadway over Flat Branch Creek, Hancock Co., $7,206—to Hinton & Smalley, Celina, two 35 ft. span concrete beam bridge, 24 ft. roadway, over Duck Creek, Mercer Co., $8,992 — to Lynn Constr. Co., Paulding, 30 ft. span concrete beam bridge over North Creek, Sect. "C" Payne-Hicksville Rd., Paulding Co., $8,532—to W. C. Brown, Chillicothe, two 20 ft. and one 25 ft. span concrete beam bridge, 24 ft. roadway, over Turkey Creek, Scioto Co., $10,772—to J. Hill, Ada, two 25 ft. span concrete slab bridge 24 ft. roadway, approaches, Auglaize Co., $6,591; 75 ft. span, steel beam bridge 24 ft. roadway, approaches, over Cranberry Creek, Putnam Co., $11,232—to Jones & Park, Hamersville, 10 x 8 x 92.5 ft. concrete box culvert, Brown Co., $3,544 — to Manuez & Koenig, Benton, three 30 ft. span, creosoted timber bridge, with steel stringers, 24 ft. roadway, approaches over White Eyes Creek, Coshocton Co., $10,660 — to W. L. Johnson Constr. Co., Hicksville, 58 ft. span, steel beam bridge, 24 ft. roadway, approaches over North Powell Creek, Defiance Co., $12,685 — to Marietta Contg. Co., Marietta, 21 x 12 x 66 ft. concrete box culvert, approaches over Collins Run, Washington Co., $21,837. Grand total $156,692. Noted Dec. 3.

Oklahoma—State Hy. Dpt., Oklahoma City, 4 span 286 ft. steel truss bridge and I-beams on piers, incl. 182.12 tons truss and I-beam steel, 78.57 lb. reinforcing steel, 10,378 lin.ft. wooden piling, at Atoka, Atoka Co., to Moran & Buckner, Muskogee, $27,313 est. $32,000; 3 span 290 ft. steel truss bridge on concrete piers, incl. 32.91 tons reinforcing steel, 1,632 lin.ft. wooden piling, at Franks, Pontotoc Co., to W. R. Montgomery, Cushing, $29,852 est. est. $35,000.

Okla., Oklahoma City—Oklahoma Co., erecting 3 span 480 ft. steel truss bridge on concrete piers, to Green Constr. Co., 110 South Lee St., $28,984. Est. $35,000.

Okla., Oklahoma City—See "Materials."

Texas—G. Gilchrist, state hy. engr., Austin, to Dozier Constr. Co., Littlefield Bldg., Austin, Sheffield Bridge, nineteen 28 ft. 6 in. concrete deck girder spans, 22 ft. roadway, and twelve 8x5x24 ft. multiple concrete box culverts, Pecos Co., $25,413 est. $50,000; twelve 28 ft. 6 in. concrete deck girder spans, 24 ft. roadway, Guadalupe Co., $16,982 est. $25,000; 3 bridges, incl. three, six, five and four 6 in. concrete deck girder spans, 40 ft. roadway, Bexar Co., $46,125 est. $50,000—to Cage Constr. Co., Taft, 38 spans, 2 concrete caisson type piers, 4 steel cylinder and concrete type bents, 33 precast concrete type bents, 3 I-beam anchor and suspensions spans, at 196 ft., three 50 ft. I-beam spans and thirty-two 28 ft. 6 in. concrete deck girder spans, 22 ft. roadway, Menard Co., $76,570 est. $90,000—to D. F. Jones Constr. Co., Little Rock, Ark., Bear and Robbs Creek Bridges, incl. four and eighteen 30 ft. 6 in. concrete deck girder spans, 22 ft. roadway, 2 multiple concrete box spans, Fayette Co., $36,185 est. $40,000—to J. F. Buckner, 407 North Main St., Cleburne, 2 concrete girder bridges, incl. ten 30 ft. 6 in. and one of five 30 ft. 6 in. concrete deck girder, 22 ft. roadway, Brazoria Co., $23,029 est. $25,000—to Jensen Constr. Co., Kimballtown, Ia., Concho River Bridge, incl. one 200 ft. steel truss, two 52 ft. steel I-beam and nineteen 38 ft. 6 in. concrete deck girder spans, 22 ft. roadway, Concho Co., $68,381 est. $80,000—to E. T. Bucy & C. T. Childs, Rising Star, approaches for above bridge, $11,592—to Trinity Farm Gravel Co., Box 1428, Dallas, Texas Electric Railway and Highway, 6 underpasses, 9-6-9-in. concrete pavement, 40 ft. roadwa, Dallas Co., $40,220 est. $50,000—to J. S. Moore & Son, Lufkin, Hickory and Cypress Creek Bridges, forty 15 ft. and thirty 20 ft. steel I-beam spans, concrete floor slabs, 22 ft. roadway, Tyler Co., $34,778 est. $40,000—to Swindell & Sonka, Yoakum, 3 steel I-beam span bridges, 22 ft. roadway, concrete floor slabs, of eight, four and three 20 ft. spans, recondition and widening 8 concrete girder and slab bridges from 15 to 20 ft. roadway, Hopkins Co., $23,398 est. $30,000. Grand total $397,673. Noted Nov. 26.

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STREETS AND ROADS

BIDS ASKED

California—Dec. 30, by C. H. Purcell, engr. State Hy. Comn., Sacramento, grading, concrete surfacing 14.6 mi. road between Tecate Divide and Mountain Springs Grade, San Diego and Imperial Counties.

Illinois—Dec. 21, by State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, concrete, bituminous filled brick on concrete, bituminous concrete (fine or coarse aggregate type) on concrete surfacing 1.04 mi. Route 21, Sect. H-R, 40 ft.—2.26 mi. Route 62, Sect. 117, 20 ft., both Cook Co.—0.27 mi. Route 33, Sect. 6-X, 18 ft., Jasper Co.—1.47 mi. Route 42, Sect. 113-F, 40 ft., also 2 strips 9½ ft. each, Lake Co.—2.33 mi. Route 59, Sect. 111, DuPage Co. —8.74 mi. Route 67, Sect. 119, 20 ft., McHenry Co.—4.22 mi. Route 80, Sect. 103 18 ft., Jo-Daviess Co.—6.98 mi. Route 80, Sect. 107, 18 ft. Whiteside and Carroll Counties—10.2 mi. Route 80, Sect. 109, 20 ft., Rock Island and Whiteside Counties—2.69 mi. Route 90, Sect. 103, 18 and 20 ft., Peoria Co.—7.59 mi. Route 94, Sect. 111, Henderson Co.—6 mi. Route 104, Sect. 140, 18 ft., Sangamon Co.—6.41 mi. Route 104, Sect. 142, 18 ft., Sangamon and Christian Counties—8.46 mi. Route 107, Sect. 107, 18 ft., Pike Co.—8.12 mi. Route 129, Sect. 107, Effingham Co.—10.07 mi. Route 133, Sect. 121, 9 and 18 ft., Douglas Co.—10.16 mi. Route 133, Sect. 122, 18 ft., Cole, Douglas and Edgar Counties—7.42 mi. Route 142-A, Sect. 101, 18 ft., Wayne Co.—10.9 mi. Route 142-A, Sect. 102, 18 ft., Hamilton Co.—4.46 mi. Route 150, Sect. 132, 18 ft., Union Co.—grading, drainage structures 9 mi. Route 6, Sect. 34-R-G, De Kalb Co.—5 mi. Route 23, Sect. 21-G, McHenry Co. —0.4 mi. Route 54, Sect. 543-P, DuPage Co. —0.25 mi. Route 54, Sect. 544-P, DuPage Co. —3.02 mi. Route 143, Sect. 105-A, Saline Co. F. T. Sheets, hy. engr.

Ia., Corydon—Dec. 21, at office Auditor Mayne Co., grading 25,921 cu.yd., also 16,729 sta.yd. overhaul, 5 concrete box culverts, totaling 173.8 cu.yd. concrete. Address County Engineer or Auditor.

Massachusetts—Dec. 22, by Dpt. P. Wks., State House, Boston, A. W. Dean, engr., bituminous macadam paving 1,890 ft. bridge approaches, King St., bitulithic concrete, type D paving 328 ft. over railroad bridge, gravel and bituminous macadam paving 567 ft. Forge River Rd., all foregoing in Littleton—bitulithic concrete paving 22,570 ft. Hingham and Norwell —bituminous macadam paving 14,960 ft. and rein.-con. dual type paving 11,437 ft. Marlboro and Shrewsbury, incl. rein.-con. bridge extension.

Mass., Worthington—Dec. 29, by Dpt. P. Wks., A. W. Dean, engr., State House, Boston, bituminous macadam paving 31,569 ft. hy., incl. extending 2 rein.-con. bridges.

Michigan—Dec. 22, by A. L. Burridge, div. engr., Cadillac, grading, drainage structures, shaping, gravel surfacing 1.468 mi. M072-20C-1, 21 ft., Roscommon Co., for State Hy. Comn., Lansing.

Michigan—Dec. 22, by H. G. Oakes, div. engr., Plymouth, grading, drainage structures 5.222 mi. F013-22C-1, Calhoun Co., for State Hy. Comn., Lansing.

Michigan—Dec. 23, by W. J. Kingscott, div. engr., Grand Rapids, grading, drainage structures 0.724 mi. F011-38C-1, Berrien Co., for State Hy. Comn., Lansing.

Mississippi—Dec. 30, by State Hy. Comn., Jackson, clearing, grubbing, grading, drainage structures 2.178 mi. Meridian-Hattiesburg Rd., Federal Aid Project 180-C, Lauderdale Co., also bridge, incl. 43,707 lb. reinforcing and 57,960 lb. structural steel, 504 lin.ft. concrete steel handrail, 2,730 lin.ft. creosoted piling; 0.658 mi. Natchez-Woodville Rd., Federal Aid Project 218-A, Adams Co., also bridge, incl. 78,900 lb. reinforcing and 212,500 lb. structural steel, 990 lin.ft. hand railing, 14,700 B.M. creosoted lumber, 4,530 lin.ft. creosoted piling, C. M. Williamson, dir.

Mo., Clayton — Dec. 23, by St. Louis Co., Court House, rein.-con. paving Lucas and Hunt Rds. R. Jablonsky, Court House, co. engr.

N. Y., Brentwood—Dec. 30, by Dpt. Mental Hygiene, State Office Bldg., Albany, concrete roads at Pilgrim State Hospital; adv. E.N.-R. Dec. 17.

N. Y., Brooklyn—Dec. 23, by H. Hesterberg, pres. Brooklyn Boro, Boro Hall, grading, granite block paving Bush and Main Sts.—grading Avenue U and East 5th St.—grading, asphalt on concrete paving Elmore Pl., Avenue S, East 5th St., Glenwood and Quentin Rds.

N. Y., Long Island City—Dec. 21, by G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., grading, stone guttering, 64th Rd., 66th St. and Cornish Ave.—grading, sidewalks, curbing, sheet asphalt and granite block on concrete paving Seneca St.—grading, sheet asphalt on concrete paving Rockaway Blvd., 15th Rd., 126th St.—grading, curbing, sidewalks, bituminous concrete on concrete paving 80th St., 31st Ave., 52nd Rd.—grading, curbing, sidewalks on 89th Ave., 15th Rd., 157th and 145th Sts.

N. Y., New York—Dec. 22, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks on Edison, Bruner and Bogart Aves.

N. Y., New York—Dec. 23, by S. Levy, pres. Manhattan Boro, Municipal Bldg., grading, granite block on concrete repaving Marginal, West and Cedar Sts.; grading, sidewalks, asphalt block on concrete paving West 187th St.

N. Y., St. George—Dec. 23, by J. A. Lynch, pres. Richmond Boro, Boro Hall, bituminous concrete repaving Park and Richmond Aves.

Oklahoma—Dec. 22, by State Hy. Dpt., Oklahoma City, grading, drainage structures 22 mi. State Hy. 18, 30 ft., McClain Co. $45,000. C. L. Wilson, hy. engr.

Pa., Waynesburg—Dec. 23, by K. W. Scott, secy., Boro Bldg., Fabric or bar mat. rein.-con. paving 952 ft. 20 ft. wide, 971 ft. 30 ft. wide and 637 ft. 28 ft. wide East Green St. $25,000. G. W. Jenkins, Boro Bldg., engr.

Tex., Jasper—Dec. 30, by City c/o A. L. Black, mayor, concrete paving 27,065 sq.yd. C. P. Hunter, Jasper, engr.

Wash., Port Orchard—Jan. 4, by Comrs. Kitsap Co., constructing 3.5 mi. Long Lake-Port Orchard Hy. $25,000—2 mi. Marine Dr. Hy. $27,000—3 mi. Keyport Hy., Lateral $31,000. J. L. Barry, Port Orchard, co. engr.

Wisconsin—Dec. 22, by State Hy. and Walworth Co. Hy. Comns., Madison, constructing 0.21 mi. Welsh Grade Separation (approaches only) S.A.P. 2023, S.T. Hy. 14.

Ont., Toronto—See "Contracts Awarded."

CONTRACTS AWARDED

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, grading 9.2 mi. 24 and 28 ft. wide and bituminous treated crushed gravel or stone (plant mix) surfacing same road 20 ft. wide between Willards and Susanville, Lassen Co., to California Constr. Co., 715 Standard Oil Bldg., San Francisco, $217,937; grading 80 and 100 ft. wide, concrete paving 30 and 40 ft. wide 5.5 mi. road between Corona del Mar and Laguna Beach, Orange Co., to Jahn & Bressi Constr. Co., Lane Mortage Bldg., Los Angeles, $366,823. Noted Nov. 27.

Calif., Los Angeles—Bd. P. Wks., City Hall, curbing, guttering, storm drains, oiling 3,540 sq.ft., 8 in. asphaltic concrete paving 325,933 sq.ft. Bway. between 93rd St. and 113th Pl. and grading, curbing, guttering, sewers, ornamental lighting system, 8 in. concrete paving 7,087 sq.ft., 2 and 3½ in. warrenite-bitulithic wearing surface paving 72,588 sq.ft., concrete paving 17,086 sq.ft. San Pedro St. from 39th St. to Vernon Ave., to Griffith Co., 502 Los Angeles Railway Bldg., $64,346 and $40,867 respectively; grading, curbing, guttering sewers, water system, ornamental lighting system, sidewalks, resurfacing 830 sq.ft. concrete and asphaltic concrete paving 67,823 sq.ft. Marmont Ave. and Woodshill Trail Impvt. Dist., to J. L. McClain, 3452 West Slauson Ave., $34,981. Grand total $140,194.

Calif., Santa Barbara—Southern California Edison Co., improving, resurfacing 14 blocks State St. between Cabrillo Blvd. and Sola St., to Western Motor Transfer Co., 116 State St., $37,500.

Florida—State Road Dpt., Tallahassee, 25,580 gal. tar prime, broken stone base surfacing 127,900 sq.yd. Rd. 22, Project 948, Orange Co., to McVay Lindsay & Son, Palm Beach, Fla., $112,948; curbing, grading, concrete sidewalks, 11,545 ft. Rd. 4, Project 60-C, Volusia Co., to Duval Concrete Co., 1800 Enterprise St., Jacksonville, $8,594. Noted Dec. 3.

Idaho—A. Harbour, comr. P. Wks., grading, crushed graveling 8.92 mi. Meridan-Juna Hy., Ada Co., to O. Nelson, Logan, Utah, $45,025. Noted Nov. 30.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, to Arcole Constr. Co., Niles Center, paving Route 54, Sect. 542, DuPage Co., $83,723—to Hartman Sark Bros., 920 Peoria Life Insurance Bldg., Peoria, Route 120, Sect. 115, Platt Co. $119,215—to States Impvt. Co., 160 North La Salle St., Chicago, Route 53, Sect. 539-X, Cook Co. $79,117—to Nelson Constr. Co., Jerseyville, Route 127, Sect. 103, Montgomery Co., $49,676—to Gund-Graham Co., Freeport, Route 85, Sect. 102-X $44,061, Route 85, Sect. 102 $58,239; Route 58, Sect. 103-X $31,691, all Mercer Co.—to J. R. Fiegel Co., 605 Adams St., Evansville, Ind., Route 146, Sect. 107-S $8,282; Route 146 Sect. 107 $118,716, both Johnson Co.—to Central Eng. Co., 809 Putnam Bldg., Davenport, Ia., grading, drainage stuctures Route 124, Sect. 101-A, Sangamon Co. $80,982. Grand total $673,702. This corrects report in Dec. 3 issue.

Illinois—State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, paving Route 61, Sect. S-112-X, McHenry Co., to G. Welch, Beloit, Wis., $20,750—Route 69, Sect. 126, Kendall Co., $89,802 —Route 48, Sects. 135 and 136, Christian Co., to Davis Constr. Co., Booneville, Mo., $131,970 and $108,782 respectively—Route 80, Sect. 112, Rock Island Co., to E. J. Eiff Co., Quincy, $130,872—Route 58, Sect. 580, Cook and Kane Counties, to E. E. Giertz & Son, Elgin, $101,062—Route 60, Sect. 120-Y, Cook Co., to I. D. Lain Co., Morton Grove, $116,602—Route 146, Sect. 106, Union Co., to W. Lough & Sons, Marion, $152,968—Route 21, Sect. 211-KVX, Cook Co., to E. A. Myers Constr. Co., Highland Park, $14,656—Route 55, Sect. 552, DuPage Co., to Municipal Paving Co., Oak Park, $21,585—Route 104, Sect. 141, Sangamon Co., to J. C. O'Connor & Sons Co., 2104 Miner Ave., Ft. Wayne, Ind., $60,225—Route 178, Sect. 106, La Salle Co., to Trompeter & Sons, Peru, $22,021— gravel surfacing Route 95, Sect. 122VAA, McDonough Co., to Breeden Bros., Jacksonville, $8,256—Route 18, Sect. 8YA, Cook Co., to A. Ward & Sons, Oak Glenn, $13,999—grading, drainage structures Route 124, Sect. 102-A, Sangamon Co., to Central Eng. Co., 809 Putnam Bldg., Davenport, Ia., $22,518—Route 150, Sect. 122-A, Jackson and Randolph Counties, to Clark, Kerney & Stark, Vienna, $78,210—Route

Streets and Roads (Continued)

121, Sect. 103-A, Tazewell Co., to F. Hillquist, Geneva, $17,729—Route 146, Sect. 104-A, Union Co., to Lefferdink Constr. Co., Springfield, $68,579—Route 148, Sect. 120-A, Jefferson Co. and Route 121, Sect. 111-A, Logan Co., to M. Wunderlich, Jefferson, Mo., $71,510 and $18,557 respectively. Grand total $1,270,653. Rejected bids paving Route 42, Sect. 113-F, Lake Co. F. T. Sheets, hy. engr. Noted Oct. 29.

Indiana—State Hy. Comn., Indianapolis, grading, grainage structures, concrete surfacing 165,672 sq.yd. Rd. 16 from Roads 41 to 53, Newton and Jasper Counties, to Gast Constr. Co., Warsaw, $203,706. Est. $257,465. Noted Nov. 12.

Ia., Iowa City—Johnson Co., grading, drainage structure 8.5 mi. trunk roads, to R. J. Phelps, Iowa City, $11,689.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures, using 1st class rein.-con. pipe 9.952 mi. Hopkinsville-La Fayette Rd., Christian Co., to Corum Bros., Madisonville, $39,787. Noted Nov. 12.

Kentucky—State Hy. Dpt., Frankfort, traffic bound surfacing 4.63 mi. Sturgis-Shawneetown Rd., Union Co., to Corum Bros., Madisonville, $21,065. Noted Aug. 6.

Maryland — State Roads Comn., aBltimore, G. C. Uhl, chn., concrete paving 1 mi. and macadam paving 0.96 mi. hy. along Dickerson-Mt. Ephreaim Rd. and Dickerson Martinsburg Rd., Contr. M-181-55, Montgomery Co., to W. J. Grove Lime Co., Lime Kiln, $33,920. Noted Oct. 22.

Michigan—A. L. Burridge, div. engr., Cadillac, grading, shaping, drainage and gravel surfacing 5.005 mi. M-20-1-C-1, Crawford Co., for State Hy. to Comn., Lansing, to Pickitt & Goodwin, Allegan, $56,644 incl. cement. Noted Nov. 12.

Michigan—H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, grading, widening, concrete surfacing 2.992 mi. FO25-23C-2, Genesee Co., for State Hy. Dpt., Lansing, to J. A. Mercier Co., 5435 Wesson St., Detroit, $96,219, incl. cement. Noted Nov. 19.

Michigan—H. W. Hagaman, div. engr., Port Huron, grading, shaping, drainage structures, concrete surfacing 0.732 mi. MO79-37C-2 and 1.269 mi. FO79-37C-2, both 20 ft. Tuscola Co., to Hersey Gravel Co., Hersey, $25,518 and $33,842 respectively; 0.922 mi. MO-74-35C-1, Sanilac Co. and 2.49 mi. MO79-31-C-1, 20 ft., Tuscola Co., to E. B. Schwaderer, Cass City, $21,783 and $71,777 respectively, all for State Hy. Dpt., Lansing. Grand total $152,920.

Michigan—H. W. Hagaman, div. engr., Port Huron, grading, shaping, drainage structures, concrete surfacing 2.263 mi. M-74-36C-1 Sanilac Co., for State Hy. Dpt., Lansing, to F. Porath, 816 Transportation Bldg., Detroit, $54,914. Noted Nov. 19.

Michigan—H. W. Hagaman, div. engr., 504 Eddy Bldg., Saginaw, widening grade, lengthening drainage structures 11.204 mi. MO25-4C-5, Genesee Co., for State Hy. Comn., Lansing, to J. A. Mercier Co., 450 West Fort St., Detroit, $32,613. Noted Nov. 5.

Michigan—W. J. Kingscott, div. engr., 213 Watson Bldg., Grand Rapids, widening, grading, drainage structures 7.118 mi. MO41-52-C-1, Kent Co., for State Hy. Dpt., Lansing, to P. and J. Gillisse, Grand Rapids, $43,612. Noted Nov. 19.

Michigan—H. G. Oakes, div. engr., Plymouth, grading, widening, lengthening drainage structures 5.84 mi. FO19-3C-9, Clinton Co., for State Hy. Dpt., Lansing, to A. Guthie & Co., Birmingham, $109,491. Noted Nov. 19.

Michigan—H. G. Oakes, div. engr., Plymouth, grading, drainage structures 1.364 mi. MO63-3-C-10, Oakland Co., for State Hy. Dpt., Lansing, to Closser Bros., Detroit, Mich., $27,645.

Michigan—H. G. Oakes, div. engr., Plymouth, grading, lengthening draining structures 6.374 mi. MO19-22C-6 Clinton Co., for State Hy. Comn., Lansing, to R. Sablain, Lansing, $19,404, incl. cement. Noted Nov. 12.

Michigan—J. T. Sharpensteen, div. engr., Escanaba, gravel surfacing 19.2 mi. MO7-17C-1, Baraga Co., for State Hy. Comn., Lansing, to L. W. Brumm, Marquette, $18,992. Noted Nov. 5.

Minnesota—State Hy. Dpt., St. Paul, grading 19.7 mi. S.P. 6-27, 6-54, Sect. 2, F.A.P. 161 and S.P. 6-54, Sect. 1, F.A.P. 343-C, to Strom Constr. Co., 404 1st Natl. Bank Bldg., Fargo, N. D., $62,157—18 mi. S.P. 6-50, Sect. 2, F.A.P. 81, to S. J. Anderson, Warren, $61,181—12.5 mi. S.P. 6-53, F.A.P. 349-D, to W. N. Petrie, Champlin, $34,457—9.8 mi. S.P. 21-24, Sect. 3, F.A.P. 420-D, to Studer & Manion, Excelsior, $52,385—12.1 mi. S.P. 47-21, Sect. 1, F.A.P. 82, and 6 mi. S.P. 58-21, Sect. 2, to C. W. McNamara, Sioux Falls, S. D., $38,591 and $29,718 respectively. Grand total $278,489. Noted Nov. 19.

Missouri—State Hy. Bd., Jefferson City, to C. K. Kost, Joplin, chats surfacing 2.822 mi. Route 106 South Sect. 1, $6,514; 2.728 mi. Sect. 2, same road $11,530, both Barton Co.—to C. F. Lytle, 504 Nebraska Bldg., Sioux City, Ia., grading, concrete paving 0.848 mi. Independence Rd. W., Sect. 61F, $22,217; 1.114 mi. Sect. 61G same road $23,871; 1.392 mi. Sect. 61E, same road $22,101; 1.748 mi. Sect. 61A same road $35,376; 4.705 mi. Sect. 61D, same road $86,417; 3.44 mi. Sect. 61B, same road $49,676, 4.754 mi. Sect. 61C same road $65,016, all foregoing Jackson Co.—to S. J. Cohan & Co., Blytheville, Ark., 0.594 mi. Dutchtown Rd. S., Cape Girardeau Co. $6,646—to Carlon Constr. Co., Maplewood, 1.197 mi. Route 65, Warsaw, Benton Co. $15,231—to P. T. O'Dell, Hannibal, 2.559 mi. St. Louis-Allentown Rd., Sect. 5 $61,067; 0.514 mi. Sectff 7, same road, $32,005, both St. Louis Co.; graveling 4.942 mi. Osage Co. $10,145; 4.811 mi. Ripley Co. $30,311; 3.004 mi. St. Francois Co. $23,763; 3.122 mi. Zell-to St. Genevieve Rd., Sect. 42, $12,581; 3.137 mi. Sect. 43, same road $16,745, both Ste. Genevieve Co.; 3.976 mi. California-Eldon Rd. Sect. 5, $12,229; 1.426 mi. Sect. 6, same road $5,923, both Miller Co.; 3.123 mi. Sect. 2 same road $11,286; 2.368 mi. Sect. 3 same road $6,798; 4.526 mi. Sect. 4 same road $12,483, all in Moniteau Co.—to Ebbe Constr. Co., Trenton, 4.617 mi. Trenton-Gault Rd., Sect. 330A $26,859; 3.35 mi. Sect. 330B, same road $18,230; 1.375 mi. Sect. 330C, same road $9,888; 3.51 mi. Sect. 116B, same road $15,129, all foregoing Grundy Co.—to Simmons & Ferman, LaPlata, graveling 3.461 mi. Knox-Bethel Rd., Sect. 17, $15,719; 3.466 mi. Sect. 18, same road $17,092—to Gaines Bros., Elsberry, 3.291 mi. Tuscumbria to Iberia, Sect. 6A $27,545; 2.644 mi. Sect. 7A same road $18,589, both Miller Co.—to Hoover Bros. Constr. Co., 1300 East 18th St., Kansas City, 2.367 mi. Sampsel-Route 8A, Sect. 1 $7,223; 2.33 mi. Sect. 2, same road $6,309; 3.419 mi. same road $8,381, all foregoing Livingston Co.—to Lahar Bros. Constr. Co., Boonville, 4.079 mi. Sect. 2, Cardwell-Buccoda Rd., $10,441; 2.931 mi. same road $7,183, both Dunklin Co.; 3.527 mi. Sect. 1A, Ripley Co.-Nealyville Rd. $4,969; 5 mi. Sect. 1 same road $15,649, both Butler Co.; 4.999 mi. Portageville-Linda Rd., Sect. 1A, $17,031; 4.850 mi. Sect. 1B, same road $14,170, both New Madrid Co.—to Kiefner & Geile, Perryville, 4.938 mi. Perry Co. $8,527—to Maxwell Constr. Co., Columbus, Kan., 0.521 mi. Wright Co. $8,729; to Hendrickson Constr. Co., Richmond, crushed stone paving 1.175 mi. Clay Co. $8,819—to Graham Bros., 6519 East 37th St., Kansas City, 0.455 mi. Lawrence Co. $4,2988—to H. W. Harris, Kansas City, 4.908 mi. Christian Co. $17,083—to Samples & Elsea, Kirksville, 3.968 mi. Centralia Rd. N., $9,821; 2.466 mi. Sect. 2 same road $4,807, both Audrain Co.; 3.963 mi. St. Patrick-Route 61 Rd., Sect. 1, $12,163; 1.723 mi. Sect. 4, same road $4,851, both Clark Co.; 4.293 mi. Memphis Rd. W., Sect. 310B, $21,617; 4.476 mi. Sect. 310A, same road $16,233, both Scotland Co.—to M. Wunderlich, Jefferson City, 4.918 mi. Pike Co. $13,559; 2.928 mi. Ralls Co. $6,425; 4.218 mi. Tarkio Rd. E. $27,232; 3.897 mi. Sect. 2 same road $22,575; 3.566 mi. Daisey-Millerville Rd., Sect. 1, $7,804; 4.233 mi. same road, Sect. 2 $10,314, both Cape Girardeau Co., 4.19 mi. Bourbon-Argo Rd., Sect. 1 $10,109; 1.318 mi. Sect. 2, same road $3,757; 0.685 mi. Dent Co. Rd. N., $4,278, all Crawford Co.; 3.918 mi. Florence Rd. S., Sect. 3 $10,221; 3.786 mi. Sect. 4 same road $8,558; 3.649 mi. Sect. 5 same road $8,975, Morgan Co.; 2.272 mi. Appleton City-Lowry City Rd., Sect. A, $5,504, 4.488 mi. Sect. 5, same road $13,922, both St. Clair Co.—to Fillin Bros., Marshfield, 4.209 mi. Marceline-Keytesville Rd., $2,582; 4.238 mi. Sect. 23, same road $2,600—to Jewett & Hardy, Shelburne, 1.533 mi. Hurland Rd. West, Sect. 1, $3,583; 1.088 mi. Newark E. Sect. 3, $3,457; 2.407 mi. LaBelle Rd. S., Sect. 3, $7,788, both Knox Co.; 2.407 mi. LaBelle Rd. S., $7,788; 1.993 mi. Newark-Route S. D. Rd., $4,953, both Lewis Co.—to O. W. Knutson, 3520 Main St., Kansas City, 4.002 mi. Marceline-Keytesville Rd., Sect. 337C, $19,533; 3.462 mi. Sect. 337D, $34,806; 4.267 mi. Sect. 337E, same road $22,567, both Chariton Co.; grading 3.524 mi. Cainsville-Route 4 Rd., Sect. 2 $8,641; 3.542 mi. Sect. 1 same road $11,499; 0.892 mi. Sect. 2, same road $3,411, all foregoing Harrison Co.; 4.375 mi. Clifton Hill Rd. N., Sect. 2, $11,255; 4.396 mi. Sect. 1 same road, $8,177; 3.4 mi. Sect. 3, same road $4,494, all foregoing Randolph Co. Grand total $1,229,865.

Nevada—Dpt. Hys., Carson City, improving 9.53 mi. Churchill Co., to Nevada Rock & Sand Co., Inc., Reno, $35,943. Noted Nov. 27.

New Jersey—Monmouth Co., Court House, Freehold, grading, rein.-con. paving Route 36, Sect. 2, to J. F. Lafferty, Haddon Heights, $621,540. Noted Nov. 12.

N. J., Lock Arbour—Ocean Twp., Township Hall, grading bituminous macadam paving portion Main St., Euclid, Page and Evergreen Aves., to Jannarone Contg. Co., 225 Passaic Ave., Belleville. Est. $25,000.

New Mexico—State Hy. Comn., Santa Fe, concrete paving 3.1 mi. F.A.P. 143-E Mod. to Haynor & Burns, Las Cruces, $65,960—6.3 mi. F.A.P. 142-E Mod. and 12.3 mi. F.A.P. 142-B Mod., to E. J. Maloney, Gallup, $15,509 and $29,514 respectively—11.1 mi. F.A.P. 125-D-E-H Mod., to Skousen Bros., Albuquerque, $24,609—9.2 mi. F.A.P. 120 Mod., to Orr & Rawls, El Paso, Tex., $26,546—10.3 mi. F.A.P. 83-B Mod., and 8.3 mi. 83-A Mod., to Armstrong & Armstrong, Roswell, $22,264 and $16,978 respectively—3.8 mi. F.A.P. 5 Reo. Mod., to McClure & Dennison, Tucumcari, $12,711—6.6 mi. F.A.P. 14-A Mod., to Mountain States Contg. Co., Gallup, $16,537. Grand total $230,628. Noted Nov. 27.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, to Pomonok Asphalt Paving Co., 1246 Grand St., asphalt paving Drew Ave., $4,495; Hegeman Ave. $11,194; Riverdale Ave. $24,211—to B. Turecamo Contg. Co., New Cropsey Lane, East 26th St. $5,128; East 27th St. $20,349; to East 46th St. $9,562—to J. and M. Moran, 413 Sterling Pl., grading Hemlock St. $3,602—to Lenze & Hesse, 9020 247th St., Bellerose, granite block paving Junius St. $9,793; Scott Ave. $9,669—to Brooklyn Alcatraz Asphalt Co., 407 Hamilton Ave., asphalt paving New York Ave. $3,898; Sutter Ave. $14,460. Grand total $116,361. Noted Nov. 19.

N. Y., New York—S. Levy, pres. Manhattan Boro, Municipal Bldg., temporary ramp, connection to elevated hy., to M. C. Seelig Co., 44 Court St., Brooklyn, $26,888—granite paving 59th St., to Meehan Paving Co., 90 West St., $11,205— 59th St. and 6th Ave., to E. T. Barry, 126-06 139th Ave., Laurelton, $22,750 and $4,670 respectively. Grand total $65,513. Noted Nov. 27.

Oklahoma—State Hy. Dpt., Oklahoma City, gravel surfacing 18.4 mi. State Hy. 14 from Snyder to Frederick, Kiowa Co. 18 ft., to Dickinson & Wray, Hitchcock, $20,876. Est. $25,000. Noted Nov. 26.

Okla., Oklahoma City—R. E. Corrigan, clk. Oklahoma Co., grading curbing, concrete paving 45,618 sq.yd. May Avenue Rd., to Brooks & Dahlgren, Insurance Bldg., $49,201. Est. $70,000. Noted Dec. 3.

Pa., Allentown — Raleigh Co., resurfacing roadway and portion sidewalk on Hamilton St. Bridge, to G. H. Hardner, Lentz Bldg., $55,578. Est. $62,000. Noted Nov. 27.

Pa., Wilkes-Barre—Widening Market St. from Welles to Hillside Sts., to Guerinzer Constr. Co. 296 Madison St., $23,200. Noted Nov. 27.

Rhode Island—State Bd. P. Roads, Providence **(F.A.P. means Federal Aid Project)**, bituminous macadam paving (penetration method) 3.7 mi. Douglas Pike, Smithfield, Contr. 3116, F.A.P. 70-A, to Amos D. Bridges Sons, Inc., Hazardville, Conn., $89,081—rein.-con. paving 2.5 mi. Barbers Heights Narragansett and North Kingstown, Contr. 3104, F.A.P. R-2 and 3.000 ft. Ironstone Rd., North Smithfield, Contr. 3124, F.A.P. 31-D, to Lane Constr. Co., 32 Colony St., Meriden, Conn., $63,335 and $31,538 respectively—grading, drainage 6 mi. Washington Hy., Smithfield and Lincoln, Contr. 3125, F.A.P. 67-A, to Hagan-Thibodeau, Eden Park, $155,671. Grand total $339,625. Noted Nov. 19.

Tex., Austin—Bd. Regents, University of Texas, c/o J. W. Calhoun, comptroller curbing, grading, 2 in. warrenite bituulithic on 5 in. concrete paving 22,580 sq.yd. San Jacinto Blvd., to Southwest Bituulithic Co., Littlefield Bldg., $48,729. Noted Nov. 12.

Washington — Director Hys., Olympia, improving 4.043 mi. Lewis Co., to C. J. Erickson, 1424 Vance Bldg., Seattle, $38,132—6.179 mi. Whatcom Co., to General Constr. Co., 3840 Iowa Ave., Seattle, $122,519—10.532 mi. Lincoln Co., to Tucker Bros. & Scott, Kalispell, Mont., $132,689—30 mi. Mason and Jefferson Counties, to E. L. Edland, 302-5 30th St., Tacoma, $14,946. Grand total $308,286. Noted Nov. 12.

Ontario—R. M. Smith, deputy minister of Hys., Toronto, concrete paving 1.9 mi. Bell River Rd., westerly, Contr. 31-59, to Canada Paving & Supply Co., 30 Sandwich St., East Windsor—grading, concrete culverts, ditching, 6.5 mi. Actinolite Rd., easterly, Contr. 31-74, to York Constr. Co., R.R. 1, Scarboro Jct., 7 mi. Kaladar Rd. W., Contr. 31-75 and 5.7 mi. Kaladar Rd. E., Contr. 31-76, to Campbell Constr. Co., 22 St. Thomas St., Toronto—5.5 mi. Arden Rd. Westerly, Contr. 31-77, to Angus & Taylor, 99 Main St. W., North Bay—7 mi. Arden Rd., Westerly, Contr. 3-78 to Duncan Constr. Co. Ltd., 30 Cedar St., Sudbury—6.6 mi. Oso Station Rd. Westerly, Contr. 31-79, to Kendall Bros. Ontario Ltd., 261 Esplanade, Toronto—7 mi. Mayberley Rd. Westerly, Contr. 31-80 and 9 mi. Mayberley Rd., Easterly, Contr. 31-91, to C. V. Billie, 502 Lumsden Bldg., Toronto. Est. $250,000. Noted Oct. 29.

Ont., Toronto — East York Twp., grading, filling, Woodbine Ave., day labor. $160,000. G. R. Sammon, 443 Sammon Ave., engr.

EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Fla., Miami—See "Bridges."

Tex., Eagle Pass—B. Taylor, Carrizo Springs, and W. C. Moody, San Antonio, purchased 12,500 acre tract in Maverick Co. and plan developing same for irrigation project. This corrects report in Nov. 5 issue.

BIDS ASKED

Calif., Long Beach—Jan. 15, by City Council, two 600 ft. harbor berths, rein.-con. retaining wall, 3 sunken railway tracks, 12 in. c.i. water mains, 10 in. vitr. clay drains, 12 in. asphaltic concrete paving loading area, 160 ft. wide, and approach 30 ft. wide, $80,000. R. G. McClone, City Hall, harbor engr.

CONTRACTS AWARDED

Ill., East St. Louis—Terminal Railroad Assn., Union Station, St. Louis, Mo., 3,800 ft. sand fill, incl. 300,000 cu.yd. material, in vicinity northeastern railroad approach to St. Louis Municipal Bridge, the sand being from Mississippi River to build up embankment on east bank Cahokia Creek between the creek and site of proposed new Union Station, to Fruin-Colnon Contg. Co., Merchants-Laclede Bldg., St. Louis, Mo. Est. $200,000.

Ill., Galesburg—See "Sewers."

Mass., Boston—Dpt. P. Wks., dredging 10,000 cu. yd. at Calf Pasture Pumping Station, Dorchester, to Bay State Dredging & Contg. Co., 62 Condor St., East Boston, $5,400.

Mass., Lynn—Dredging municipal channel, to G. H. Breymann & Bros., 17 Battery Pl., New York, $97,850; inverted syphon for municipal channel, Lynn Harbor, to Merritt, Chapman & Scott Corp., Pequot Ave., New London, Conn., $63,931.

Mich., Grosse Pointe Farms—Wayne Co. (Detroit), 2 mi. rein.-con. sea wall along Lake Shore Dr. and Lake St. Clair, to Geo. R. Cooke Co., 1216 Penobscot Bldg., Detroit, $165,000.

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Excavation, Drainage, Irrigation, Levees, River and Harbor (Continued)

O., Toledo—Lucas Co., Court House, A. E. Schmidt, clk., diverting water of and straightening Swan Creek in Waterville Twp., to J. E. Girkins, R.F.D., Whitehouse; cleaning channel creek, Swanton Twp., to Murray Constr. Co., 1418 Berdan Ave., Toledo; diverting water from County Ditch, 403, Swanton Twp., to Barton Bros., Monclova. Noted Oct. 29.

Que., Montreal—See "Subways and Tunnels."

Bond Elections

Coming Bond Elections

Waterworks—Herndon, Kan., $25,000.
Waterworks Add.—Enid, Okla., $250,000.
Natural Gas System—Oswego, Kan., $32,000.
Schools—Ft. Worth, Tex., January, $4,500,000.

Bonds Voted

Waterworks—Holcomb, N. Y., $32,000.
Sewage Disposal Plant—Laguna Beach, Calif., $180,000.
Light and Power Plant—Milford, Iowa., $80,000. F. H. Merritt, Mayor.
Power Plant—Villisca, Iowa, $150,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ia., Davenport—POST OFFICE and COURT HOUSE—Treas. Dpt. at office Sup. Archt., Wash., D. C., soon takes bids 3 story, basement, 126 x 172 ft., concrete, stone, granite base, marble, 4th and Perry Sts. $665,000. J. A. Wetmore, c/o owner, acting superv. archt. S. J. Temple, 710 Union Bank Bldg., assoc. archt. Noted May 7.

Kan., Holton—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by J. A. Wetmore, acting superv. archt., c/o owner, rein.-con., brick U. S. Post Office, $85,000. Site selected.

Mich., Holland Harbor—DREDGING—U. S. Eng., Milwaukee, Wis., channel and turning basin in Black Lake.

Mich., Iron Mountain — POST OFFICE — Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by J. J. Dise, W. A. Stewart, and R. L. Hoffman, McKerchey Bldg., Detroit, 2 story, basement, brick, steel, rein.-con. post office, $170,000.

Mich., Marshall—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by Stratton & Hyde, Marquette Bldg., Detroit, and H. F. Young, Kalamazoo, 2 story, basement, brick, steel, rein.-con. post office, $150,000.

Miss., Winona—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., rein.-con., brick, stone, Summit St. $75,000.

N. J., Barnegat—DREDGING and JETTIES—U. S. Eng., Whitehall Bldg., New York, dredging Barnegat Inlet and 2 jetties, $500,000. **Maturity indefinite.**

N. J., Ridgefield Park — POST OFFICE — Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel post office, $150,000. **Maturity in spring.**

N. J., Ridgewood—Treas. Dpt. at office Sup. Archt., Wash., D. C., 2 story, basement, brick, steel post office, $150,000. **Maturity in spring.**

Okla., Ada—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by W. T. Schmitt, Equity Bldg., Oklahoma City, and J. A. Wetmore, acting superv. archt., c/o owner, 2 story, basement, brick, rein.-con., steel, stone post office, $250,000. Site selected. Noted Oct. 1.

Okla., Clinton — HOSPITAL — Cheyenne & Arapaho Indian Agency, L. S. Bonnin, supt., Concho, soon takes bids 2 story, basement, brick, steel, stone, $90,000. Noted Sept. 3.

R. I., East Greenwich—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans by F. J. Anthony, 143 Elton St., Providence, 1 story, basement, brick, stone post office, $65,000. Noted Sept. 3.

Va., Danville—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office.

Alaska, Anchorage—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., Wash., D. C., federal building, $400,000.

Alaska, Fairbanks—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., Wash., D. C., federal building, $450,000.

Alaska, Ketchikan—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., Wash., D. C., federal building, $400,000.

BIDS ASKED

Ala., Montgomery—POST OFFICE—Jan. 5, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, $1,000,000. Noted Nov. 12.

Ark., Hot Springs—HOSPITAL—Jan. 20, at office Con. Q.M. hospital at Army and Navy General Hospital; adv. E.N.-R. Dec. 10.

Ark.-Tex., Texarkana—POST OFFICE—Jan. 11, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, Court House; adv. E.N.-R. Dec. 17. Noted Oct. 1.

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D. C., Wash.—BRIDGE—Dec. 30, in this office Room 1613, Navy Bldg., steel bridge carrying Rock Creek and Potomac Parkway over Rock Creek, at L St. N. W.

Illinois—LEVEE—Jan. 5, by U. S. Eng. Office, Rock Island, new cut-off levee in Indian Grave D.D.; adv. E.N.-R. Dec. 17.

Ill., Carlinville—POST OFFICE—Jan. 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office; adv. E.N.-R. Dec. 17. Noted May 14.

Mass., Boston—PORTLAND CEMENT—Dec. 22, by Bureau Supplies & Accounts, Wash., D. C., 1,000 bbl. portland cement in cloth bags, for Navy Dpt.

Mississippi — EARTHWORK — Dec. 22, by U. S. Eng., P. O. Box 667, Vicksburg, 3,250 cu.yd. earthwork on east bank Mississippi River.

Miss., Vicksburg—LUMBER—Dec. 22, by U. S. Eng., Box 667, yellow pine lumber.

N. H., Portsmouth—CEMENT—Dec. 22, by Yards & Docks, Navy Dpt., Wash., D. C., 200 bbl. portland cement in paper bags for Navy Dpt.

N. Y., Brooklyn—WIRE—Dec. 21, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., wire.

N. C., Wilmington—BOILER TUBES—Dec. 21, by U. S. Eng., 308 Custom House, 100 boiler tubes, seamless steel, 2 in. O.D. by 5 ft. 2½ in. long No. 13, B.W.G., f.o.b. Wilmington.

N. C., Wilmington—BUILDING—Dec. 22, by U. S. Eng., Wilmington, 60 x 100 ft. steel building.

O., Youngstown—POST OFFICE—Jan. 6, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office; adv. E.N.-R. Dec. 17.

R. I., Newport — CEMENT — Dec. 22, by Bureau Supplies & Accounts, Wash., D. C., 750 bbl. portland cement in paper bags, for Navy Dpt.

South Carolina—DREDGING—Dec. 29, by U. S. Eng., Charleston, 89,948 cu.yd. waterway from Charleston to Winyah Bay; adv. E.N.-R. Dec. 17.

Va., Langley Field — ADMINISTRATION BUILDING—Jan. 6, by Con. Q.M., Fort Monroe, administration building within Langley Field area. $200,000.

Wash., Walla Walla—SUBSISTENCE BUILDING, etc.—Dec. 29, by Vet. Bu. Arlington Bldg., Wash., D. C., subsistence building, connecting corridors, incinerator, laundry addition, attendant's quarters, over garage, grading, etc., at U. S. Veterans Administration Building.

Wis., Monroe—POST OFFICE—Jan. 4, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office; adv. E.N.-R. Dec. 17.

CONTRACTS AWARDED

Arizona—ROAD—Pub. Rds., Dpt. Interior, Wash., D. C., improving Grand Canyon East Approach for Grand Canyon Nat. Park, to Everly & Allison, Albuquerque, N. M., $145,000.

Arizona—ROAD—Pub. Rds., Phoenix, grading, draining 7.1 mi. Lee's Ferry Bridge to Cameron Rd., Coconino Co., to Everly & Allison, Des Moines, N. M., $167,149. Noted Nov. 9.

Calif., Sawtelle — HOSPITAL — Vet. Bu., Arlington Bldg., Wash., D. C., U. S. Hospital addition, incl. plumbing, heating, electrical work, to Murch Bros. Constr. Co., Railway Express Bldg., St. Louis, Mo. $340,600. Est. $550,000. Noted Oct. 29.

Calif., Sunnyvale—MOORING MAST, etc.—Yards & Docks, Navy Dpt., Wash., D. C., mooring mast, etc., at Sunnyvale Dirigible Base, to San Francisco Constr. Co., 3159 Fillmore St., San Francisco, $22,635.

Florida—GROIN, etc.—U. S. Eng., Jacksonville, constructing groin and repairing south jetty at entrance St. John's River, to Van Gordon Constr. Co., Jacksonville, $15,320. Noted Oct. 22.

Ill., Chicago — ELECTRIC EQUIPMENT — U. S. Eng., 333 North Michigan Ave., electrical equipment for locks in Illinois Waterway, to Wadeford Electric Co., 205 West Wacker Dr., $64,356. Noted Oct. 22.

La., Morgan City — POST OFFICE — Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office, to A. Blair, Montgomery, Ala., $52,380. Noted Nov. 5.

Missouri—CLUMP DIKES—U. S. Eng., 700 Postal Telegraph Bldg., Kansas City, 7,520 lin.ft. dikes in Missouri River at Rising Creek Bend and Cote Sans Dessen Reach, to W. P. McGeorge, Pine Bluff, Ark., $223,418. Noted Oct. 22.

Mo., Glasgow—CLUMP DIKES—U. S. Eng., 707 Postal Telegraph Bldg., Kansas City, 3,020 lin.ft. dikes in Missouri River, Bluffport Reach, to Massman Constr. Co., 519 American Bank Bldg., Kansas City, $87,312; 3,480 lin.ft. dikes at Wayne City, to G. W. Condon Co., 233 Grain Exchange Bldg., Omaha, Neb., $90,381. Noted Oct. 29.

Mo., Springfield—SEWERS—Dpt. Justice, Bureau Federal Prisons, Wash., D. C., sewers and pumping station, to W. F. Plummer, Union Natl. Bank Bldg., $11,968.

Neb., Omaha—CLEARING SITE—Treas. Dpt. at office Sup. Archt., Wash. D. C. clearing site for U. S. Post Office, to Globe Wrecking Co., 2951 South State St., Chicago, Ill., $5,690.

Neb., Winnebago—HOSPITAL—Dpt. Indian Affairs, C. J. Rhoads, comr., 2 story, basement, 43 x 220 ft. hospital, to C. B. Johnson & Son, Kimball Bldg., Chicago, Ill. $118,700. Noted Oct. 8.

Nev., Boulder City—RESIDENCES—Bureau Reclamation, Las Vegas, nine 5 room residences, to Bay & Morrell, Junction, Utah, $16,143. Est. $35,000. Owner furnishes all material. Noted Nov. 5.

N. J., Lake Denmark—SHELL HOUSE, etc.—Yards & Docks, Navy Dpt., Wash., D. C., general contract 1 story shell house and magazine to McCay & Kirkland, 23 West Mount Royal Ave., Baltimore, Md. Est. $150,000. Noted Nov. 12.

Ore., Marshfield — DREDGING — U. S. Eng., Portland, 265,000 cu. yd. channel in Isthmus Slough Coos Bay, to Oregon Bridge & Dredging Co., Bd. Trade Bldg., Portland, at $0.1145 per yd., total $29,547. Noted Nov. 27.

Ore., Portland—COURT HOUSE, etc.—Treas. Dpt. at office Sup. Archt., Wash., D. C., general contract federal building and court house, to Murch Bros. Constr. Co., Railway Exch. Bldg., St. Louis, Mo. $1,156,000. Noted Oct. 29.

R. I., Pawtucket—POST OFFICE—Treas. Dpt. at office Sup. Archt., Wash., D. C., heating and plumbing in U. S. Post Office, to A. P. Rose & Son, Kokomo, Ind.; electrical work, to New England Machine & Electric Co., 77 Bayley St., Pawtucket, R. I. Noted Sept. 24, under "Contracts Awarded."

RAILWAYS

PROPOSED WORK

Pennsylvania—Pennsylvania R.R. Co., Broad St. Sta., 1617 Pennsylvania Blvd., Phila., T. J. Skillman, ch. engr., soon takes bids relocating, elevating 2 mi. track south of Linesville in connection with converting Pymatuning Swamp into flood reserve.

CONTRACTS AWARDED

Indiana—Chesapeake & Ohio R.R. Co., Richmond, Va., C. W. Johns, ch. engr., 1 story, 30 x 100 ft., brick, steel, stone round house, at Peru, to K. E. Reed & Co., Charleston, W. Va. Est. $40,000.

West Virginia—Chesapeake & Ohio R.R. Co., Richmond, Va., C. W. Johns, ch. engr., extending 2 yard tracks at Raleigh, to Langhorne & Langhorne Co., Huntington, $57,500.

SUBWAYS AND TUNNELS

PROPOSED WORK

N. Y., Flushing—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, plans complete and project approved 7.78 track mi. 3 tracks from Main to 147th Sts. and 2 stacks to 221st St., for Roosevelt Ave., 1st St., Station Rd. and 38th St. Line, as extension to present Flushing line. $9,600,000.

N. Y., Long Island City—Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., New York, plans and authorized by Bd. Estimate 26.2 track mi. subway 98-99th St.-Hawtree St. Line, from 78th St. to Hammels Station, $20,200,000: 7.78 track mi. extension to present Flushing Line, Roosevelt Ave.-1st St.-Station Rd.—and 38th Ave. Line, $9,600,000; 26.7 track mi. Ditmars Ave.-Astoria Blvd.-120th St.—and Nassau Blvd. Line, 2nd Ave. to Cross Island Blvd., $17,700,000.

CONTRACTS AWARDED

Que., Montreal—Executive Com., constructing St. Joseph Blvd. Tunnel, to Kendall Bros. Ltd., 1605 Iberville St., $399,764; retaining wall, at Bellevue Park, to Ulric Boileau Ltd., 4869 Garnier St., $20,684. Noted Mar. 19, under "Grade Crossings."

Que., Montreal—Executive Com., reconstructing St. Dennis St. Tunnel, to Ulric Boileau Ltd., 4869 Garnier St., $108,966; pedestrian tunnel at Wasson St., to Marchessault Bros., Montreal, $7,440.

GRADE CROSSINGS

PROPOSED WORK

Calif., Oakland—State Hy. Dpt., Sacramento, underpass at Oakdale Crossing, Merced Co. C. Purcell, Pub. Wks. Bldg., Sacramento, hy. engr.

Mass., Quincy—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, A. W. Dean, engr., City, and New York, New Haven & Hartford R.R., E. E. Oviatt, ch. engr., New Haven, Conn., completed preliminary plans grade crossing elimination Willard St., $250,000. Noted Mar. 12.

Mass., Taunton—Commonwealth of Massachusetts, State House, Boston, A. W. Dean, engr., City, and New York, New Haven & Hartford R.R., E. E. Oviatt, ch. engr., New Haven, Conn., completed preliminary plans grade crossing elimination, Middleboro Ave., $60,000; also at County St., $70,000. Noted Feb. 26.

Mass., Weymouth—Commonwealth of Massachusetts, State House, Boston, Town, and New York, New Haven & Hartford R.R., E. E. Oviatt, ch. engr., New Haven, Conn., completed preliminary plans grade crossing elimination, Main St. $80,000. Noted Feb. 19.

Tex., Dallas—City and Missouri-Kansas-Texas R.R., F. Ringer, ch. engr., St. Louis, Mo., and Cotton Belt Ry. Co., subsidiary St. Louis South Western R.R., W. S. Hanley, ch. engr., Tyler, and Rock Island Railroads, plans complete, underpass and approaches, Lamar St. $325,000. Noted July 9.

New York—Public Service Comn., Albany, approved 170 road or railroad grade crossings to be considered for elimination in 1932. List available. Address Business News Dpt. Noted Dec. 3.

BIDS ASKED

Mich., Dearborn—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., San Jose—Southern Pacific R.R. Co., 65 Market St., San Francisco, G. W. Boschke, ch. engr., constructing rein.-con., steel highway

Grade Crossings (Continued)

subway, to R. E. McKee, 108 West 6th St., Los Angeles, $130,000.

Mich., Dearborn—Wayne Co. (Detroit) and Michigan Central R.R. Co., Passenger Terminal Sta., Detroit, J. F. Deimling, ch. engr., grade separation to provide 60 ft. clear span for double hy., 2 sidewalks under railroad subway structure to be rein.-con., steel encased in concrete, at Airport Dr., county forces. $175,000.

N. Y., Buffalo—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York. Erie R.R., G. S. Fanning, ch. engr., Midland Bank Bldg., Cleveland, O., Canadian Natl. Ry., C. S. Gzowski, ch. engr., Montreal, Que., and Delaware, Lackawanna & Western R.R. Co., G. J. Ray, ch. engr., Hoboken, N. J., eliminating grade crossing at Amherst, Austin and Tonawanda Sts., to Wash Constr. Co., Herald Bldg., Syracuse, $431,377; 3,000 tons structural steel for above, to McClintic-Marshall, 39 Bway., New York. Noted Oct. 29.

DAMS

PROPOSED WORK

Ia., Panora—Plans underway 20 ft. dam across Coon River to create 1,000 acre lake and state park, near here.

PIERS AND WHARVES

PROPOSED WORK

Que., Montreal East—PIER, etc.—Montreal Harbour Comrs., pier on premises British American Oil Co., $246,446; wharf at Sun Oil Co. plant, $70,000.

AIRPORTS

CONTRACTS AWARDED

Mo., Kansas City — Landon Airlines, T. G. Landon, Municipal Airport, 1 story, rein.-con., brick hangar, shop and office building, Municipal Airport, to W. K. Marton Constr. Co., 448 Dwight Bldg. Est. $40,000.

POWER AND LIGHTING

PROPOSED WORK

Ia., Adel—Iowa Power & Light Co., 312 6th St., Des Moines, F. C. Macy, mgr., expending $55,000, improving Adel division, incl. new lines, equipment.

Ia., Ruston—City preliminary plans distribution system in city compressor station, also pipe line to Monroe gas fields. $180,000. C. G. Coyne, mayor.

Mo., Vandalia — Missouri State Pub. Serv. Comn., authorized Missouri Power & Light Co., 740 Bd. Trade Bldg., Kansas City, to construct and operate gas distribution system, incl. 9 mi. distribution mains.

CONTRACTS AWARDED

Calif., Los Angeles—See "Streets and Roads."

Ill., Evanston—Bd. Local Impvts., City Hall, A. W. Hanford, pres., street lighting system, using metal poles, to Contracting & Materials Co., 42 East Pearson St., $1,047,428. Noted Nov. 12.

PARKS AND SPORTS

PROPOSED WORK

Ia., Panora—See "Dams."

Ia., Sioux City—Sioux City Country Club, 40th and Jackson Sts., bids about spring rein.-con. swimming pool. $30,000.

Mass., Somerville—Commonwealth of Massachusetts, Metropolitan Dist. Comn., 20 Somerset St., Boston, strandway park and beach, west side Mystic River. To exceed $25,000.

Mass., Middlesex Falls—Commonwealth of Massachusetts, Metropolitan Dist. Comn., 20 Somerset St., Boston, golf course. $25,000. Engineer not appointed.

N. J., Keyport — Bd. Educ., High School, athletic field, incl. grading, sodding, concrete work, rear of high school. $25,000. **Maturity soon.** Engineer not appointed.

N. Y., Brooklyn—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, bath house extensions, roof garden, Coney Island. To exceed $100,000. Money unappropriated. **Maturity indefinite.**

N. Y., Farmingdale—Long Island State Park Comn., Babylon, park and golf course, on Yoakum Estate. To exceed $1,000,000, incl. site. Owner has option on site indefinite when major improvements will mature.

O., Dayton—H. E. Holmes, pres. Dayton Baseball Club, 104 Eugene Ave., soon takes bids timber, concrete grandstand for new baseball park, plain found., Herman Ave. $30,000.

CONTRACTS AWARDED

Ia., Burlington—Kiwanis Club of Burlington, c/o C. H. Walsh, pres., 100 x 150 ft. swimming pool, also wading pool, to Burkin & Burkin, Burlington. Est. $35,000. Noted July 30.

Mass., Boston—City, Park Dpt., 33 Beacon St., field house and grading, McConnell Park, Springdale and Denny Sts., Dorchester, $30,000; concrete bleachers and grading, Fallon Field, South Robert and South Waters Sts., Roslindale, $25,000; playground, Germantown Sect., West Roxbury, $50,000; athletic field extension, Rogers Park, Lake and Foster Sts., Brighton, $25,000.

N. J., Paterson—Bd. City Comrs., City Hall, general contract concrete, steel stadium, to M. A. Carty, 78 Summit Ave., Phillipsburg, Pa., $108,300; plumbing, to F. A. McBride, 327 Grand Ave., $15,392; heating, to Standard Plumbing & Heating Co., 181 Ellison St., $4,095; electrical work, to Independent Electric Constr. Co., 201 Howe Ave., Passaic, $5,694; steel, to J. K. Cook & Son, 210 Blvd., Clifton, $11,984. Grand total, $145,465. Awarded in October. Noted Sept. 3.

N. Y., New York—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, field house, Morningside Park, to H. W. Banks Co., 101 Park Ave., $11,293; heating coils, to Prominent Heating Co., 1446 44th St., $1,256; sheet metal work at playground building Hamilton Fish Park, to J. F. Ferguson, 504 West 53rd St., $1,540; wading pool in Carmansville Playground, to S. Goldner, 24 North 40th St., $2,363; cement paving Corlear's Park, to M. J. Cauldwell, 6423 83rd Pl., Elmhurst, $14,400. Grand total $30,852. Noted Nov. 26.

Ont., Toronto—City, regatta course, incl. 3,000 ft. new inner breakwater, 2 concrete promenades, 10,000 seating capacity, at exhibition park, $346,000. Large portion of work by day labor, balance by contract. R. C. Harris, City Hall, engr. Noted Nov. 12.

HEATING AND VENTILATING

PROPOSED WORK

Ind., Harmony — Township School, W. T. Roberts, trustee, R.R.3, remodeling, heating, plumbing and electric plant, incl. new septic tank, metal partitions, electric pump, $25,000. C. Wallen, Terre Haute, engr.

BIDS ASKED

N. Y., Stapleton—Dec. 24, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., New York, steam heating, ventilating work for Male Pavilions A, B, C and D, New York City Farm Colony. C. B. Meyers, 31 Union Sq., New York, archt.

CONTRACTS AWARDED

Ind., Attica—School Comrs., steam heating plant, to H. F. Miller, 114 West Pike St., Crawfordsville; ventilating, to Hartmann Co., 1725 Wabash Ave., Terre Haute; stokers, to Braden Mfg. Co., 431 North 14th St., Terre Haute. Est. $25,000.

Pa., Phila. — C. E. Myers, dir. Dpt. City Transit, City Hall Annex, altering heating system for east side of city hall, Contr. 255, to E. F. Roberts, 2622 Columbia Ave., $16,437. Noted Dec. 3.

UNCLASSIFIED

PROPOSED WORK

Conn., Noank—SHIPYARD—East Coast Ship & Yacht Corp., H. F. Morse, pres., Noank, fireproof storage buildings, sheds under cover storage basin, 3 turntables, electric handling equipment 2,500 ton dry dock, additional marine railway, for shipyard. To exceed $50,000. Private plans.

Ia., Sioux City — TELEPHONE IMPROVEMENTS—Northwestern Bell Telephone Co., 604 9th Ave., Des Moines, will expend $85,000, extension of dial service. Private plans.

La., New Orleans—RADIO STATION—Sta. W.W.L.—Loyola University, 6363 St. Charles St., constructing new transmitting station, 10,000 watts, 2 steel towers, transmitter shack, dynamos, other equipment. $80,000. Engineer not appointed.

Mass., Boston — SIGNAL SYSTEM — City, Traffic Comn., extending traffic signal light system from Mass. Ave. to Southampton St. $42,000 appropriated.

N. J., Colonia — COMMUNITY CENTRE — Corporation, c/o J. B. Tiffany, archt., Colonia, 2 story, basement, brick, steel, near Middlesex County Park. $150,000. **Maturity soon.**

Ontario—GAS and COKE PLANT—Hamilton By-Product Coke Ovens Ltd., 4 Hughson St. S., Hamilton, gas and coke plant, incl. distribution mains, Port Arthur and Fort William. $1,000,000. Private plans. Rate payers of Fort William and Port Arthur, voted for by-law permitting owners to construct plant.

BIDS ASKED

N. Y., New York—ELEVATORS—See "Contracts Awarded."

N. Y., Geneva—GREENHOUSES—Dec. 29, by Commissioner Educ., Education Bldg., Albany, greenhouses for New York State Agricultural Station; adv. E.N.-R. Dec. 17.

CONTRACTS AWARDED

Kan., Chanute—PIPE LINE—Reuben & Gordon Willis, et al., 8.5 mi. natural gas pipe line from city to gas fields, to R.-G. Machine & Auto Co., 25 South Grant St., $25,000.

Massachusetts—FILLING STATIONS—Standard Oil Co. of New York, Park Sq. Bldg., Boston, concrete filling stations, 1 at Main St., Pittsfield, other at North St., Shelbourne and Main St., Plymouth, to C. O. Olsson, 621 Mt. Auburn St., Cambridge. Total est. $25,000.

Mass., Waltham — ELECTRICAL WORK — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, electrical work in medical and surgical building at Metropolitan State Hospital, to Quinn Bros., 150 Warren St., Roxbury, $27,100. Noted Nov. 19 under "Hospitals."

N. J., Irvington (Dr., Newark) — SCALE PITS, etc.—Lehigh Valley R.R. Co., foot Washington St., Jersey City, general contract 1 story brick steel scale pits and scale shed, to F. D. Trainer & Son, Inc., 17 South St. Est. $40,000. Noted Nov. 26.

N. Y., New York—ALTERING TIERS—R. C. Patterson, Jr., comr. Correction, Municipal Bldg., altering 8 tiers North Wing, City Prison, to F. Teicher, 1697 Madison Ave., $33,879.

N. Y., New York—ELEVATORS—Empire State, Inc., 350 5th Ave., bank 26 elevators to serve from basement to 1st floor in office building, 5th Ave. and 34th St., separate contracts and day labor, $75,000. Shreve, Lamb & Harmon, 11 East 4th St., archts. Noted Dec. 3.

Pa., Phila—ESCALATORS—Dpt. City Transit, City Hall Annex, C. E. Myers, dir., escalators at 8th and Market Sts. in City Hall court yard, Contr. 320, to Otis Elevator Co., 502 North 19th St., $137,156. Noted Sept. 22.

Que., Montreal East — COAL HANDLING BRIDGE—Canada Cement Co., Montreal East, one 5 ton rope trolley coal handling bridge, to Canadian Mead Morrison Co. Ltd., Welland, Ont., $100,000.

MATERIALS

PROPOSED WORK

CEMENT, ASPHALT, etc.—**London, Ont.**—A. Near, city engr., preparing estimates and takes bids about Jan. 15 for all supplies of cement, asphalt, broken stone, castings, road oil, required for 1932.

BIDS ASKED

CAST IRON BELL PIPE, etc. — **Hartford, Conn.**—Dec. 21, by Bd. Contr. & Supply, R. Dillon, secy., 8,000 ft. 12 in. centrifugally cast iron pipe Class 150 and 367 tons 12 in. pit cast pipe AWWA Class C, for Metropolitan Dist., 550 Main St.

CEMENT and SAND—**Chicago, Ill.**—Dec. 23, by Dpt. P. Wks., City Hall, furnishing, delivering in bulk 70,000 bbl. portland cement for Chicago Avenue Tunnel Extension, 673 West Chicago Ave.; 3,900 tons Mason sand delivered at various locations as per requirements of Bureau Engineering for term ending Dec. 31, 1932.

RAILROAD TIES—**New York, N. Y.**—Dec. 21, by M. F. Kenney, acting and deputy comr. Purchase, Municipal Bldg., railroad ties to Dpt. Sanitation.

TRAFFIC CABLE—**New York, N. Y.**—Dec. 23, by M. F. Kenney, deputy and acting comr. Purchase, Municipal Bldg., traffic cable and warning signal units to Police Dpt.

STRUCTURAL STEEL—**Phila., Pa.**—Dec. 22, by C. E. Myers, purch. agt., Pennsylvania R.R. Co., 15 North 32nd St., structural steel, Contr. 34-1931.

RAILS—**Seattle, Wash.**—Dec. 22, by W. D. Freeman, city purch. agt., County-City Bldg., 500 gross tons rails for Municipal Street Railway, City-County Bldg.

CONTRACTS AWARDED

CAST IRON PIPE—**Oakland, Calif.**—J. K. Kimball, secy., East Bay Municipal Utility Dist., 1,950 ft. ¼ in. thick, 24 in. diam. electric welded sheet steel pipe, to Steel Tank & Pipe Co., 1100 4th St., Berkeley, $7,492.

LIQUID ASPHALT—**Florida**—State Road Dpt., Tallahassee, B. M. Duncan, hy. engr., 490,000 gal. liquid asphalt, f.o.b. barge, Rd. 10, Project 688, Bay Co., to Mexican Petroleum Corp., Tallahassee, $24,108. Noted Nov. 26.

LUMBER, etc.—**Cedar Rapids, Ia.**—Linn Co., furnishing bridge lumber, to Nebraska Bridge & Supply & Lumber Co., 448 Peters Trust Bldg., Omaha, Neb., $4,932. Noted Dec. 3.

LUMBER, PIPE, etc.—**Council Bluffs, Ia.**—Pottawattamie Co., bridge lumber and piling during 1931 and 1932 season, to Wheeler Lumber, Bridge & Supply Co., 606 Hubbell Bldg., Des Moines, $23,193; 6,032 lin. ft. corrugated culvert pipe, to Iowa Culvert & Pipe Co., Des Moines, $7,273. Noted Nov. 26.

BRIDGE LUMBER, etc.—**Osceola, Ia.**—Bd. Supervs., Clarke Co., 147,000 ft. untreated and 30,900 ft. creosoted bridge lumber, also 2,000 ft. creosoted piling, to Morris Lumber Co., Eugene, Ore., $6,471 and $520 respectively. Noted Nov. 19.

CEMENT, etc. — **Annandale, N. J.** — C. N. Leathem, Jr., state archt., Trenton, 3,400 bbl. cement, to B. W. Farrington, Annandale, $5,027; 2,200 tons sand, to Gallo San Co., Neteong, $1,484, for Dpt. Institutions Agencies, Trenton. Noted Nov. 12.

CEMENT—**Oklahoma City, Okla.**—Oklahoma Co., 60,000 sacks cement for road work, to Dewey Portland Cement Co., Tradesmens Bldg., $24,150. Est. $26,000.

STEEL—**Oklahoma City, Okla.**—Oklahoma Co., bridge and reinforcing steel, incl. 95 tons reinforcing bars, 381 tons structural steel for county roads, to Capitol Steel Co., South Agnew Ave., $27,869.

PORTLAND CEMENT—**Madison, Wis.**—State Hy. Dpt., portland cement for 1932, 425,000 bbl., to Manitowoc Portland Cement Co., Manitowoc; 200,000 bbl., to Marquette Portland Cement Co., Chicago, Ill.; 150,000 bbl., to Petoskey Portland Cement Co., Petoskey, Mich.;

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Materials (Continued)

125,000 bbl., to Lehigh Portland Cement Co., 111 West Washington St., Chicago, Ill.; 100,000 bbl., to Universal-Atlas Cement Co., 1208 South La Salle St., Chicago, Ill.; 50,000 bbl. to Alpha Portland Cement Co., 165 West Wacker Dr., Chicago, Ill.; 25,000 bbl., to Huron Portland Cement Co., 1325 Ford Bldg., Detroit, Mich.; 25,000 bbl., to Lone Star Portland Cement Co., Continental Bank Bldg., Indianapolis, Ind.; 25,000 bbl., to Dewey Portland Cement Co., Linwood Lane, Davenport, Ia.; 25,000 bbl., to Northwest States Portland Cement Co., Mason City, Ia. Noted Nov. 23.

EQUIPMENT

PROPOSED WORK

DIESEL ENGINES—**Crown Point, Ind.**—City Council, W. V. Youkey, mayor, purchasing Diesel engines. L. Knight, city engr.

BIDS ASKED

MAINTAINERS—**Montezuma, Ia.**—Dec. 22, at office Auditor Poweshick Co., two one-man maintainers. Address County Engineer or Auditor.

PLOWS—**Boston, Mass.**—Dec. 21, by Supply Dpt., P. A. Chapman, supt., 23 blade type plows to Pub. Wks. Dpt.

TRACTOR—**Cambridge, Mass.** — Owner, c/o P. O. Box 22, in market 20 hp. caterpillar tractor.

SNOW PLOW—**Marlboro, Mass.**—Mt. Ward farm in market snow plow.

CRANE STRUCTURE—**Brooklyn, N. Y.**—Dec. 23, by H. Hesterberg pres. Brooklyn Boro, Boro Hall, hand power traveling crane structure at Municipal Asphalt Repair Plant.

ELECTRIC EQUIPMENT—**Phila., Pa.**—Dec. 29, by Dpt. City Transit, C. E. Meyrs, dir., City Hall Annex, Contr. 220, furnishing, installing relocating electrical equipment in sub-stations and subway.

WATER GATE VALVES, etc.—**Providence, R. I.**—Dec. 21, by Bd. Contract & Supply, water gate valves, flush hydrants, boxes and covers.

ROAD MACHINERY—**Coleman, Tex.**—Dec. 21, by City, c/o M. Collins, 1 or more crawler type tractors, not less than 35 hp. and 70 ft. leaning wheel grader, with rack and pinion lift and scarifier attachment, to take in as payment one 30 hp. caterpillar tractor, 1 Austin Block scarifier, 1 Austin Jr. grader and 1 Austin street sweeper.

CONTRACTS AWARDED

ELECTRICAL EQUIPMENT—**Chicago, Ill.**—Bd. Local Impvts., City Hall, electrical equipment for Ogden Avenue double leaf trunnion bascule bridges over North Branch Chicago River, to Pierce Electric Co., 367 West Adams St.

ELECTRIC MOTORS—**Boston, Mass.**—City, Transit Dpt., 1 Beacon St., additional electric motors for traffic tunnel between Boston and East Boston, to Lincoln Electric Co. 10 High St., $25,197. Noted Oct. 22.

STEAM BOILERS—**Columbus, O.**—Dpt. Welfare, 9th and Oak Sts., J. McSweeney, dir., installing two 500 hp. steam boilers for power plant at Ohio Penitentiary, to take care of heating of new state office building (under construction), to Babcock & Wilcox Co., Guard Bldg., Cleveland. $85,080. Est. $117,000. Noted Nov. 19.

ENGINE and GENERATOR—**Morganza, Pa.**—Pennsylvania Training School, new engine and generator for power plant improvements, to Dravo Doyle Co., 302 Pennsylvania Ave., Pittsburgh, $17,380.

FOREIGN

New South Wales, Sydney—Feb. 1, Dpt. P. Wks., supplying and erecting fine screening plant for sewage treatment.

Poland—Telephone & General Trust, Ltd., London, England, and State-Operated System, c/o Polish Government, Warsaw, awarded contract converting telephone system to Strowger system, to Associated Telephone & Telegraph Co., 100 West Monroe St., Chicago, Ill. Est. to exceed $3,000,000.

Uruguay, Montevideo—Government awarded contract national telephone system to German Siemens-Haeske Co., Berlin, Germany. Est. $2,000,000.

Commercial Buildings

RESIDENTIAL

PROPOSED WORK

N. Y., New York—Corporation, c/o F. F. French, 551 5th Ave., residential development, East Bway. between Manhattan and Brooklyn Bridges. $50,000,000. Sites acquired.

BIDS ASKED

N. J., Jersey City—See "Contracts Awarded."

N. J., Newark—See "Contracts Awarded."

N. J., North Bergen — See "Contracts Awarded."

N. J., Paterson—Letz & Katz, 555 East 27th St., separate contract bids about Feb. 1, 5 story, basement, brick, steel, Carroll St. $150,000. J. Holt, 134 Market St., archt.

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N. Y., Brooklyn—See "Contracts Awarded."

N. Y., Long Island City — See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

Pa., Springfield—Folson & Stanton, archts., Architects Bldg., Phila., Pa., soon lets contract 10 story, basement, 100 x 100 ft., rein.-con., brick, steel, plain found., Ballymere Rd. and Woodland Ave., for owner, c/o architects.

CONTRACTS AWARDED

N. J., Asbury Park—J. L. Goodrich, 205 East 42nd St., New York, bids late in June, separate contracts 9 story, basement, brick, steel, Park Ave. and Deal Lake Dr. $350,000. E. Roth, 18 East 48th St., New York, archt. Owner now financing project.

N. J., Jersey City—New Jersey Realty Holding Co., 26 Journal Sq., 5 story, basement, brick, steel, Duncan Ave., separate contracts. $150,000. C. Shilowitz, 26 Journal Sq., archt.

N. J., Newark—F. Heydt, 60 Garrison St., 3 story, basement, brick, steel, Garrison St., separate contracts. $150,000. H. Metzer, 31 Elizabeth Ave., Newark, archt.

N. J., North Bergen—R. Rinaldi, 516 Robinson St., 3 story, basement, 50 x 100 ft., brick, steel, 48th St., separate contracts, $150,000. L. Fienen, 3697 Blvd., Jersey City, archt. Noted May 7.

N. Y., Brooklyn—D. Isacowitz & Sons, 1662 Pitkin Ave., 6 story apartment, store, Bristol St. and Pitkin Ave., separate contracts. To exceed $250,000. Cohn Bros., 215 Montague St., archts.

N. Y., Long Island City—Schuzzano Realty Corp., 39-24 112th St., 4 story, 33rd Ave. and 28th St., separate contracts. $155,000. Wuest & Bailey, 32-03 30th Ave., Astoria, archts.

N. Y., New York—Elbro Realty Corp., E. W. Browning, pres., 1860 Bway., altering 9 story apartment, incl. plumbing, heating equipment Cathedral Parkway and 7th Ave., separate contracts. $150,000. **Maturity indefinite.** E. Roth, 1182 Bway., archt.

N. Y., New York—Corporation, c/o J. Billig, 1581 Jerome Ave., 6 story, 97 x 263 ft., Bronx Park and Pelham Parkway, separate contracts. $500,000. H. I. Feldman, 15 West 44th St., archt.

N. Y., New York—Corporation, c/o L. Weisman, 1457 Boscobel Ave., 6 story, basement, brick, steel, 242nd St. near Dash Pl., separate contracts. $150,000. C. Kreymborg, 2534 Marion Ave., archt.

N. Y., New York—Flowerdale Constr. Co., 4409 Albany Post Rd., apartment, Mosholu Ave. and Fieldson Rd., separate contracts. $150,000. deNeergard, 4409 Albany Post Rd., archt.

N. Y., New York—Kossuth Building Corp., 332 East 149th St., 6 story, 208th St. and Kossuth Ave., separate contracts. $150,000. J. L. Crausman, 332 East 149th St., archt.

N. Y., New York—Terreville Constr. Corp., 1910 Arthur Ave., 7 story, 112 x 125 ft. Macombs Rd. and 170th St., separate contracts. $300,000. G. W. Swiller, 4215 3rd Ave., archt.

CLUBS

PROPOSED WORK

Mich., Detroit—Y. W. C. A., 2230 Witherell St., plans by Malcolmson, Higginbotham & Trout, 1217 Griswold St., 4 story, basement, 81 x 156 ft., rein.-con., brick, steel, incl. gymasium, auditorium, plain found., Elizabeth St. $200,000.

N. J., New Brunswick—B.P.O.E. Lodge 324, 40 Livingston Ave., 2 story, basement, brick, steel club addition. $150,000. Architect not appointed. **Maturity soon.**

N. J., Ridgewood—Y. M. C. A., 112 Oak St., plans by C. Wendehack, 101 Park Ave., New York, 3½ story, basement, brick, steel building, $150,00. **Maturity late 1932.** Noted Dec. 3.

Pa., Phila.—North Philadelphia Odd Fellows Assn., 4038 North 8th St., plans by E. A. Stopper, Liberty Trust Bldg., 3 story, basement, 48 x 120 ft., steel, brick lodge, plain found., 1208-12 West Lehigh St. $150,000.

HOSPITALS

PROPOSED WORK

Ind., Indianapolis — Central State Hospital, 3000 West Washington St., plans by McGuire & Shook, 941 North Meridian St., 3 story, basement men's building, steel, stone, rein.-con., at Indiana State Insane Hospital, brick, 3000 West Washington St. $175,000. Bevington-Williams, 1139 Knights of Pythias Bldg., engrs.

Mass., Worcester — City, Belmont Hospital, Health Dpt., City Hall, hospital unit. $150,000 or more. Architect not appointed.

N. J., Montvale—Dpt. Institutions & Agencies, State Office Bldg., Trenton, brick, steel tubercular hospital. $400,000. **Maturity indefinite.** Div. Architecture & Constr., Trenton, archt.

N. Y., New York — Mount Sinai Hospital, 101st St., 5th and Madison Aves., bids after Jan. 1, general contract 5 story, basement, brick, steel dispensary drug room, freight elevators, and bridge over court, 101st St., 5th and Madison Aves. $150,000. Gehron & Ross, 101 Park Ave., archts.

Conn., Bridgeport—St. Vincent's Hospital, A. Fidelio in charge, bids about Jan. 1, 2 story, basement, brick, stone hospital, plain found., 2820 Main St. $150,000 or more. E. G. Southey, 695 Main St., archt. Noted Sept. 3.

Mass., Fall River—Dec. 22, by Union Hospital, J. Smithies, supt., and E. I. Marvel, archt., 209 Bedford St., archt., 4 story, basement, brick, stone, steel nurses' home, plain found., Prospect St., $200,000; plumbing and electrical work, $25,000; heating and ventilating, $25,000. Noted Oct. 22.

Mass., Fall River—Dec. 22, by City, City Auditor, City Hall, remodeling and reconstructing maternity hospital into contagious hospital, General Hospital Grounds. $150,000. Private plans.

N. Y., Creedmoor—Dec. 30, by Dpt. Mental Hygiene, State Office Bldg., Albany, completing construction work, turnnels, altering existing Building N, Brooklyn State Hospital, Creedmoor Div.

N. Y., Dannemora—Dec. 22, by Dpt. Correction, Municipal Bldg., Albany, 4-family staff house, Dannemora State Hospital; adv. E.N.-R. Dec. 17.

N. Y., New York—Dec. 21, by J. G. W. Greeff, comr. Hospitals, Municipal Bldg., nurses home addition, equipment, Metropolitan Hospital, Welfare Island. Landsman & Smith, 105 West 40th St., archt.

N. Y., New York—Dec. 21, by J. G. W. Greeff, comr. Dpt. Hospitals, Municipal Bldg., altering and constructing nurses home addition, Fordham Hospital, Southern Blvd., and Crotona Ave., B. R. Swartburg, Inc., 2 West 46th St., archts; also altering for fire prevehtion Fordham Hospital, Southern Blvd. near Fordham Rd., C. B. Meyers, 31 Union Sq., archt. Noted June 11.

N. Y., New York—Dec. 24, by Dpt. Hospitals, J. G. W. Greeff, comr., Municipal Bldg., general contract, dormitory for male employees, Metropolitan Hospital, Welfare Island.

CONTRACTS AWARDED

Mass., Waltham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, basement, 40 x 127 ft., 50 x 80 ft. and two 35 x 85 ft. ells, brick, steel medical and surgical hospital, to Crane Constr. Co., Inc., 80 Boylston St., Boston, est. $400,000; plumbing, to J. S. Cassidy, 133 Austin St., Cambridge, $22,970; heating, to R. H. Baker, Inc., 238 Main St., Cambridge, $43,690. Noted Nov. 19.

Mass., Waverly — Commonwealth of Massachusetts, Dpt. Mental Dieases, State House, Boston, 3 story, 45 x 120 ft., brick, steel, cast stone employees dormitory, to Frank Lesordo Co., 24 School St., Boston. Est. $150,000. Noted Sept. 24.

N. Y., New York—College of Physicians & Surgeons (Presbyterian Hospital) hospital addition Bway. and 168th St., to Marc Eidlitz, 100 East 42nd St. Est. $175,000.

Tenn., Bolivar—R. Lyle, comr. Institutions Western State Hospital, addition, incl. dormitory, tuberculosis wings, fireproof, to Rock City Constr. Co., 137 4th Ave. N., Nashville, conditional upon funds available and state balancing budget, etc. Noted Sept. 17.

CHURCHES

PROPOSED WORK

Conn., Watertown—St. John's Church, C. P. Teulings, pastor, plans by Cram & Ferguson, 248 Boylston St., Boston, Mass., and soon takes bids 1 story, stone church, tower, Main St. $150,000 or more. Noted Nov. 5.

Mass., Leicester—St. Joseph's Parish, 763 Main St., rejected bids 4 story, 60 x 100 ft., brick, stone convent for Sisters of Mercy, Main St. $150,000. J. W. Donohue, 1200 Main St., Springfield, archt. Action will be delayed until some time during 1932. Noted Oct. 15.

Mo., Kansas City—Church of Christ Scientist, 2 story, basement, rein.-con., brick, Ward Parkway. $150,000. Keene & Simpson, 1005 Land Bank Bldg., archts. E. Pfuhl, Fairfax Bldg., engr.

N. J., Maplewood—Owner, c/o R. Sellick, archt., 222 Market St., Newark, 2 story, basement, brick, steel church. $150,000. **Maturity indefinite.**

N. J., Morris Plains—C. W. Bolton & Son, archts., Schaff Bldg., Phila., Pa., soon lets general contract 1 and 2 story, basement, brick, steel, Speedwell and Hillview Aves., for Presbyterian Church of Morris Plains, 55 Park Pl. $150,000. Architect taking separate bids on heating, lighting fixtures, stained glass, pews.

N. J., Perth Amboy — St. Michaels Church, c/o G. W. Brooks, archt., 216 Smith St., sketches 2 story, basement, brick, steel, Hull Ave. $150,000. Noted July 16.

N. J. Princeton—Owner, c/o F. F. Durang, archt., 110 West Dudley Ave., Westfield, sketches 2 story, basement, brick, steel chapel. $150,000.

N. J., Verona—Calvary Evangelical Lutheran Church, G. A. Dewig, pastor, 704 Bloomfield Ave., 2 story, basement, brick, steel, plain found. South Prospect St. $150,000. **Maturity soon.**

Pa., Allentown—Jacoby & Everette, archts., Commonwealth Bldg., soon lets contract 98 x 119 ft., rein.-con., brick, steel, stone church, concrete found., 10th and Allen Sts., for Seibert Congregation. $160,000.

Pa., Olyphant—St. Patricks Church plans by E. J. Rutledge, archt. and engr., Union Natl. Bank Bldg., Scranton, brick, steel, plain found. $150,000.

R. I., Cumberland—Cistercian Monastery of Our Lady of the Valley, sketches by A. J. Murphy, 25 Fennes St., Providence, Monastery Unit 2. $150,000 or more.

Churches (Continued)

BIDS ASKED

Ala., Montgomery—Jan. 5, by Court St. Methodist Church, J. W. Frazier, pastor, 2 and 3 story, Gothic design church and Sunday school, Fairview Ave. and Norman Bridge Rd. $300,000. G. Awsumb, Dermon Bldg., Memphis, Tenn., archt. Noted Oct. 29.

SCHOOLS

PROPOSED WORK

Calif., Los Angeles—University of California, 3551 University Ave., plans by Allison & Allison, 1005 California Reserve Bank Bldg., 3 story, basement, 65 x 130 ft., rein.-con., brick, terra cotta, concrete, hollow tile physics building, on campus. $200,000.

Conn., Thomaston—City, N. Johnson, chn. School Buildings, high school. $150,000. Architect not appointed.

Conn., Westbrook—Town, O. H. Chalker, School Bd., plans by Langdon & Palmer, 240 State St., New London, 1 story, 110 x 165 ft., brick school, South Main St. $125,000-$150,000.

Del., Lewes—State School Building Com., H. V. Holloway, supt., Dover, sketches by Guilbert & Betelle, 20 Branford Pl., Newark, N. J., 2 story, basement, brick, steel school, plain found. $150,000.

Ind., Hammond—School Comrs. plans by J. T. Hutton & Son, Hammond, Thomas A. Edison Grade School, 3 story, basement, 150 x 225 ft., rein.-con., brick, stone, Jackson and Spruce Sts. $350,000.

Ind., Warsaw—School Comrs. sketches 2 story, basement, high school, Main and Indiana Sts. $150,000. J. Leffel, supt.

Mass., Dedham—St. Mary's Roman Catholic Parish, G. P. O'Connor, pastor, 420 High St., soon lets contract brick school, High St. $150,000. Wadsworth, Hubbard & Smith, 11 Beacon St., Boston, archts.

Mass., Lowell—Commonwealth of Massachusetts, Lowell Textile Institute, Dpt. Educ., State House, Boston, brick, steel textile school unit. $150,000. Architect not appointed.

Mass., Revere—City, A. Cassasa, mayor, sketches by Silverman & Brown, 51 Cornhill, Boston, brick, steel high school addition. $300,000. Noted July 16.

Mass., Springfield—Springfield College, 287 Hichery St., recreation building college unit. $150,000 or more. Private plans.

Mich., St. Johns—Bd. Educ. sketches by R. V. Gay, St. Johns, 2 story, basement, rein.-con., concrete, brick, stone school, plain found. $170,000.

N. H., Durham—University of New Hampshire, E. M. Lewis, sketches by E. T. Huddleston, Durham, dormitory on campus. $150,000 or more.

N. J., Hackensack—Bd. Educ., 355 State St., revised sketches by A. E. Dore, 15 Main St., School 2, 2 story, basement, brick, steel, rein.-con., Union and Meyer Sts. $150,000. Noted Oct. 8.

N. J., Hillside—Bd. Educ., H. Doremus, pres., revised sketches by J. Wind, Jr., 1450 North Broad St., 2 story, basement, brick, steel, rein.-con. school. $150,000.

N. J., Jersey City—Guilbert & Betelle, archts., 20 Branford Pl., Newark, prepared revised sketches and takes bids in March, general contract 2 story, basement, brick, steel school, for Sacred Heart Roman Catholic Church, M. Ripple, pastor, Bayonne and Jackson Aves. $150,000.

N. J., Lakewood—Bd. Educ., revised sketches by C. B. Cook, 505 Bond St., Asbury Park, two 2 story, basement, brick, steel schools. $150,-000. Noted Oct. 1.

N. J., Middletown—Bd. Educ., Middletown Twp. new sketches by E. A. Arend, Kinmouth Bldg., Asbury Park, altering and constructing 2 story, basement, brick, steel addition. $150,000.

N. J., New Brunswick—New Jersey College for Women, Nichol and Sey Aves., sketches by Ludlow & Peabody, 1 and 2 story, basement, brick, steel library, gymnasium. $150,000. Noted Dec. 3.

N. J., Paterson—Bd. Educ., A. E. Patmos, pres., City Hall, bids in March on revised sketches School 5, 2 story, basement, brick steel, Totowa Ave. $250,000. Lee & Hewitt, 152 Market St., archts. Noted Oct. 1.

N. J., Peapack — Bd. Educ., Peapack and Gladstone Boros, Main St., sketches by A. Merchant, 1 Elm Row, New Brunswick, 2 story, basement, brick, steel, rein.-con. school addition, $150,000. Noted Sept. 3.

N. J., Pequannock — Bd. Educ., Pompton Turnpike, 2 story, basement, brick, steel school. $150,000. **Maturity indefinite.** Architect not appointed.

N. J., Piscataway town—Bd. Educ., Raritan Twp., sketches by A. Merchant, 1 Elm Row, New Brunswick, 2 story, basement, brick, steel, rein.-con. school. $150,000.

N. J., Ridgefield Park — Bd. Educ., G. Noethling, dist. clk., new sketches by Hacker & Hacker, 201 Main St., Fort Lee, altering and constructing 2 story, basement, brick, steel addition, Teaneck Rd. $200,000.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, high school, vicinity 16th Ave. and 79th Sts. $2,500,000.

N. Y., New York—Bd. Higher Educ., Hunter College, Park Ave. and 68th St., bids late in January, general contract, 5 story colege. Bedford Park Blvd. and Navy Ave. $4,400,000. Thompson, Holmes & Converse, 101 Park Ave., archts. Noted Dec. 3.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. R. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, high school, vicinity Boynton Ave. and East 172nd St. $2,500,000. Site selected. Noted Oct. 1.

N. Y., Richmond Hill—Bd. Educ., 500 Park Ave., New York plans by W. C. Martin, archt., Flatbush Ave. extension and Concord St., Brooklyn, school, near old South Rd., and aqueduct. $460,000.

Pa., Cambridge Springs — Polish National Alliance, W. Cytacki, in charge Building Com., plans by N. Kostrażanowski, 57 Woodward Ave., Detroit, Mich., brick, terra cotta administration building, concrete found., $250,000; 2 story, basement, brick, steel recitation building, $200,000, both on college campus. **Maturity in spring.**

Pa., Bellevue—Bd. Educ., S. F. McKee, pres., 73 North Harrison Ave., plans by E. Stotz, Bessemer Bldg., Pittsburgh, and bids early in spring, Junior and Senior High School, brick, steel, Jefferson and South Howard Sts. $250,-000. Noted Nov. 5.

Pa., Phila.—Bd. Educ. plans by I. T. Catharine, 19th and Ludlow Sts., Girls High School, rein.-con. brick, plain found., 17th and Spring Garden Sts. $1,000,000.

Pa., Pittsburgh — Mt. Mercy Academy, 5th Ave., plans by Kaiser, Neal & Reid, Keystone Bldg., and takes bids early in 1932, brick, steel academy, 5th Ave. $175,000.

Wis., Appleton—Lawrence College, H. Wriston, pres., rein-con., steel conservatory of music. $160,000. Architect not appointed.

Ont., Hamilton—Bd. Educ., City Hall, plans by B. H. and F. Prack, 36 James St. S., 2 story, basement, brick, concrete, steel, stone addition to Westdale Collegiate Institute, Paradise Rd. $150,000.

Ont., Toronto—Bd. Educ., plans by C. E. Dyson, 155 College St., 1 or 2 story, basement, concrete, brick, stone, steel, Blythwood Rd. $150,000.

Ont., Toronto—East York Twp., S. S. 7, A. Croft, secy., 64 Holborne St., 2 story, basement, 12 room, concrete, stone, brick, steel school, incl. auditorium, gymnasium, Plains Rd. $150,-000. Architect not appointed.

Ont., Toronto—Imperial Order Daughters of the Empire, c/o F. H. Wilkes, archt., 96 Bloor St. W., concrete, brick, stone, steel preventorium comprising administration building, hospital, living quarters, gymnasium and central heating plant. $400,000.

Que., Montreal—Montreal Protestant School Comn., 3458 McTavish St., 5 story, 81 x 136 ft., stone-face, steel, brick administration building. $210,000.

Que., Montreal—Roman Catholic School Comn., 117 St. Catherine St. W., V. Dore, chn., plans by Commission Architect, school for crippled children. $150,000.

Que., Montreal—Roman Catholic School Comn., 113 Ste. Catherine St. W., 3 story, brick, steel, school for Parish of Notre Dame du Couer de La Salle. $162,000.

BIDS ASKED

Calif., Yountsville—Dec. 29, by State Dpt. P. Wks., Sacramento, 4 story, rein.-con. administration building, two 4 story, rein.-con. ward buildings, 1 and 2 story, rein.-con. service buildings for State. $350,000 or more.

Conn., Hartford—Dec. 29, by West Middle School Dist., F. Merrels, chn. School Com., for Noah Webster School, 2 story, 80 x 120 ft. brick, rein.-con., steel, incl. gymnasium, Tremont St. $150,000. Malmfeldt, Adams & Prentice, 15 Lewis St., archts. Noted June 25.

Ind., Angola—Jan. 15, by School Comrs., 2 story, basement, 108x232 ft., rein.-con., brick, stone high and grade school. $150,000. Pohlmeyer & Pohlmeyer, 260 Central Bldg., Ft. Wayne, archts.

La., New Orleans — Rathbone DeBuys, Hibernia Bank Bldg., taking bids general contract 3 story, brick school, Cromwell Pl., between Calhoun St. and Loyola University, for Congregation of Most Holy Name of Jesus. $200,000. Noted Oct. 29.

Mass., Roxbury (sta. Boston)—Dec. 23, by City Dpt. School Buildings, 2 story, basement, brick, limestone elementary school, plain found., H. L. Higginson Dist., $220,000. Fay, Spofford & Thorndike, 44 School St., Boston, archts. Noted July 23.

N. J., Montclair—Dec. 30, by Bd. Educ., State House, Trenton, general contract 2 story, basement, 182-192 ft., concrete auditorium and classroom building, at State Teachers College. Guilbert & Betelle, Commercial Bldg., Newark, archts. Noted Aug. 20.

N. Y., Greenport — Dec. 23, by Bd. Educ., School Dist. 10, grade and high school. Tooker & Marsh, 101 Park Ave., New York, archts. Noted Nov. 27 Daily.

Tex., Longview—Bd. Educ. bids about Jan. 10, 3 story, brick, rein.-con. school, plain found. $175,000. Noted Dec. 3.

CONTRACTS AWARDED

Conn., Portland — Town, W. Penfield, chn. Building Com., Junior-Senior High School, 2 story, basement, 60 x 125 ft., brick, incl. manual training departments, to T. H. Sellew, Cromwell. Est. $150,000. Noted Nov. 26.

Mass., Chatham—Town, Bd. Selectmen, and McLaughlin & Burr, archts., 88 Tremont St., Boston, altering and constructing 2 story, basement, brick school addition, plain found., to R. H. Sewell & Co., Cataldi Bldg., Franklin, $129,980. Noted Nov. 26.

N. J., Bordentown—State Educ. Dpt., Trenton, general contract boys dormitory, to Yardley Constr. Co., 50th and Woodland Sts., Phila., Pa., $95,725; heating and ventilating, to Burns, Lane & Richardson, 301 Burnet St., $9,164; plumbing, to Ruehl & Hatfield, 384 South 10th St., Newark, $13,703; steel, to Bethlehem Steel Co., Bethlehem Pa., $5,634; electrical work, to Brown Electric Co. Trenton, $5,896. Grand total $130,479. Noted Nov. 12.

N. Y., Albion — Bd. Educ., general contract Junior and Senior High School, to Lour & Mack, Niagara Falls; heating, to F. G. Cook & Sons, Kenmore; plumbing, to Yarchez Co., 733 Lake Ave., Rochester; electrical work to Modern Electric Co., 639 Main St., Buffalo. Noted Nov. 5.

N. Y., Amityville—Bd. Educ., school, Park Ave., to J. H. French Co., 110 East 42nd St., New York, $154,260; heating and ventilating, to J. McCullough, Hicksville, $26,900; plumbing, to P. S. Olsen, 11 Prospect St., Huntington $15,398; electrical work, to Meeker & Co., Williston Park, $10,235. Grand total $206,793.

N. Y., New York—St. Francis Xavier Roman Catholic Church, school and convent, Van Nest and Haight Ave., to F. O'Hare Co., 270 Madison Ave., Est. $200,000.

O., Tiltonsville—Warren Twp., general contract 3 story, basement school, to Wendling Bros., Dover, $87,595.

Pa., Glenshaw—Bd. Educ., Shaler Twp., general contract 3 story, basement, 88 x 228 ft., brick, hollow tile limestone elementary and high school, to Fairchance Lumber Co., Fairchance; plumbing, to Superior Pump & Sanitation Co., 24th and Sidney Sts., Pittsburgh; electrical work, to Hale Electric Co., 6202 Pennsylvania Ave., Pittsburgh. Est. $220,000. Noted Nov. 19.

Pa., Phila.—Bd. Educ., E. Merchant, bus. mgr., general contract 3 story, basement 141 x 213 ft., rein.-con., brick grammar school, plain found., to Cramp & Co., Denckla Bldg. $315897, heating, to S. Faith & Co., 12th and Callowhill Sts. $33,854, ventilating, to S. J. Dommer & Son, 2436 Brown St. $1,960, electrical work, to W. V. Pangborne Co., 1927 West Montgomery St. $20,990, plumbing, to J. Bugger & Son, 2124 East Cumberland St., $17,699; 3 story, basement, 31 x 118 ft. and 50 x 90 ft., rein.-con., brick, steel addition, plain found., to Kober Constr. Co., 1616 West Thompson St. $135,000, heating, to S. Faith & Co., 12th and Callowhill Sts. $16,950, electrical work to Lennig Bros., 827 Spring Garden St. $8,262, ventilating, to W. L. Chamera, 216 Arch St. $999 plumbing, to Bulman Bros., 2501 North 5th St. $5,983. Grand total $557,505. Noted Dec. 3.

THEATRES

PROPOSED WORK

Vt., Bellows Falls—Suter Estate, J. W. Suter, trustee, Bellows Falls, reconstructing 3 story, basement theatre, store, office building, recently destroyed by fire. $150,000. Architect not appointed.

Ont., Sarnia—M. Harris, 264 Brock St. N., plans by S. Allister, 1741 Christina St. N., 80 x 175 ft., brick, tile, steel theatre. $200,000.

CONTRACTS AWARDED

R. I., Providence—J. Conn, 368 Friendship St., brick, steel, theatre, store, Chestnut and Broad Sts., to E. Turgeon, 36 Exchange St. Est. $150,000. Noted Nov. 12.

BANKS

PROPOSED WORK

N. J., Bradley Beach—First Natl. Bank of Bradley Beach sketches altering 1 story, basement, brick, steel, Main St. $150,000.

BIDS ASKED

R. I., Providence—Dec. 21, by High St. Bank, 846 Westminster St., and Angell & Swift, archts., 87 Weybosset St., altering 2 story, basement, brick, concrete, steel, concrete found., Winter and Westminster Sts. $150,000.

CONTRACTS AWARDED

Pa., Pittsburgh—Mellon National Bank Co. (lessee), Mellon Natl. Bank Bldg., 1st floor, basement of office building, 7th and Grant Sts., to Mellon Stewart Co., Oliver Bldg., vault reinforcing, to Consolidated Expanded Metals Co., 6026 Hamilton Ave., for Gulf Refining Co., 7th and Grant Sts. Est. $150,000.

OFFICES

PROPOSED WORK

N. J., Red Bank—Jersey Central Power & Light Co., Seabright Rd., sketches by Polhemus & Coffin, 232 Madison Ave., New York, 2 story, basement, brick, steel office, $150,000. Noted Dec. 3.

BIDS ASKED

N. J., Long Branch — See "Contracts Awarded."

CONTRACTS AWARDED

N. J., Long Branch—Jones & Van Hise & Ledwitz, 176 Bway., 2 story, basement, brick, steel office, 225 Bway., separate contracts, $150,000. General contract bids rejected. L. Cubberly, 210 Bway., archt. Noted Nov. 19.

STORES

PROPOSED WORK

Mass., Revere—J. McLaughlin, c/o P. J. Brown, archt., 51 Cornhill, Boston, 3 story, basement, brick, stone, steel store, shop, office, plain found. 350 Broadway. $150,000.

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Stores (Continued)

B. C., Vancouver—Woodwards, Ltd., Hastings and Abbott Sts., plans by Dominion Constr. Co., Ltd., archts. and engrs., 509 Richards St., and bids about Dec. 31, general contract 3 story, 2 basement, 50 x 132 ft., steel, concrete, brick, rein.-con., store, plain found., Cordova St. $150,000. Structural steel contract awarded to Western Bridge Co., Ltd., 1st Ave. and Columbia St., $25,000.

N. J., Bernardsville—Fischer & Brown, archts., 102 North Ave., Plainfield, soon lets general contract 1 and 2 story, basement, brick, steel store, apartment, Mine Brook Rd., for John Trl, 71 Claremont Rd. $150,000.

N. J., Long Branch—J. Helcotis, 904 Bergh Ave., Asbury Park, sketches altering and constructing 3 story, basement, brick, steel store, apartment addition, Bway. $150,000.

N. J., Newark—H. Stevens, 480 Central Ave., 2 story, basement, brick, steel store, apartment, 18th Ave. $150,000. **Maturity soon.**

BIDS ASKED

Ill., Chicago—Klee Bros., 1200 Milwaukee Ave., taking bids general contract 3 story, limestone, terra cotta, store, office Belmont and Ashland Aves. A. Epstein, 2001 West Pershing Rd., engr. Noted Sept. 18.

N. J., Asbury Park—C. B. Cook, archt., 505 Bond St., general contract bids about Jan. 15, on revised plans 2 story, basement, brick, steel store, office, for J. Ackerman, 404 Asbury Ave. $150,000. Noted Oct. 22.

N. J., Plainfield—C. C. Gordon, 437 North Ave., taking bids general contract 3 story, basement, 70 x 100 ft., brick, steel store, office, East Front St. $150,000. W. L. Finne, 124 West Jersey St., Elizabeth, archt. Noted Dec. 3.

N. J., Union — H. Forman, 103 Broad St., Elizabeth, taking bids general contract 2 story, basement, brick, steel store, $150,000. Poggi & Bragdon, 275 Morris Ave., Elizabeth, archts.

CONTRACTS AWARDED

N. Y., New York—Corporation, c/o S. Lerber, 2043 Holland Ave., 6 story, store, apartment, Bronxdale Ave. and Austin Pl., to Lerber Constr. Co., 2043 Holland Ave. Est. $325,000. Contractor soon lets separate contracts.

PUBLIC

PROPOSED WORK

Calif., Sacramento—CITY HALL—City fireproof city hall annex. $150,000. Architect not appointed.

Conn., Rocky Hill—VETERANS HOME—State, State Veterans Home Comn., Hartford, veterans home at Rocky Hill. $250,000. Wynne & Hahn, 902 Chapel St., New Haven, engrs. Architect not appointed.

Mass., Nantucket—OFFICE—Town and Nantucket Co., plans by F. L. Ackerman, 25 West 44th St., New York, town and county building. $160,000. Bids on excavation, etc., in March or later. Noted Nov. 19.

N. J., Jersey City—LIBRARY—Bd. Trustees Free Public Library, 472 Jersey Ave., 3 story, basement, brick, steel library. $200,000. **Maturity in April.** Architect not appointed.

N. Y., Brooklyn—HALL of RECORDS—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, hall of records, vicinity Boro Hall. To exceed $250,000. **Maturity indefinite.** No appropriation.

Okla., Atoka — REFORMATORY — State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches by Layton, Hicks & Forsythe, Braniff Bldg., Oklahoma City, reformatory. $450,000.

R. I., Providence—LIBRARY—Providence Public Library Assn., c/o A. Harkness, archt., Industrial Trust Bldg., 1 and 2 story, basement, brick, Candace St. $150,000.

Tex., Longview—COURT HOUSE, etc.—Gregg Co., c/o W. R. Hughes, judge, 5 story, 93 x 110 ft., light brick, terra cotta, steel courthouse and jail. $200,000. Date for closing bids (Dec. 21), temporarily postponed, awaiting approval of bonds. Voelker & Dixon, Perkins-Snider Bldg., Wichita Falls, archts., Noted Dec. 3, under "Bids Asked."

BIDS ASKED

N. Y., Elmira—CELL BLOCKS—Dec. 29, by Commissioner Correction, State Office Bldg., Albany, remodeling interior Cell Blocks A and B, Elmira State Prison; adv. E.N.-R. Dec. 17. Noted Nov. 26.

N. J., South Belmar—BORO HALL, etc.—Bd. Boro Council, bids about Jan. 22, 2 story, basement, brick, steel boro hall, police headquarters, $150,000. H. B. Seymour, 512 McClellan Ave., Long Branch, archt. Noted Sept. 24.

N. Y., Kingston—ARMORY—Dec. 29, by Adjutant General, Div. Military & Naval Affairs, Albany, completing contract for construction armory for field artillery; adv. E.N.-R. Dec. 17.

CONTRACTS AWARDED

Mass., Boston—OFFICE—Dpt. P. Wks., Commonwealth of Massachusetts, 8 story, basement, 90 x 365 ft., brick, limestone, steel, plain found., to F. V. Warren Co., 15th and Locust Sts., Phila., Pa., $1,199,489. Noted Nov. 12

Mass., Tewkesbury—EMPLOYEES—Dpt. P. Welfare, Commonwealth of Massachusetts, State House, Boston, to Allan A. Gillis Constr. Co., 313 Washington St., Newton Centre, employees building $74,000, men's unit $70,000, superintendent's cottage $12,000. Grand total $156,000. Noted Nov. 12.

Mass., Wrentham—EMPLOYEES DORMITORY Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, basement, 45 x 165 ft., brick, to Crane Constr. Co., Inc., 80 Boylston St., Boston. $104,300. Noted Nov. 12.

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UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—EXCHANGE—Southern California Telephone Co., 740 South Oliver St., 3 story, steel exchange building to be known as Angelus Telephone Building, 3434 East 4th St. $1,100,000, incl. equipment. **Maturity about Jan. 1.**

Me., Portland—EXCHANGE—New England Telephone & Telegraph Co., 50 Oliver St., Boston, Mass., plans by Densmore, Le Clear & Robbins, Park Sq. Bldg., Boston, Mass., and soon takes bids 3 story, basement, brick, steel, plain found. $150,000. Noted Oct. 29.

Me., Portland—HOME—Caldwell Post American Legion, V. Stevens, in charge, sketches by Miller & Beal, Inc., 465 Congress St., American Legion Home, Ocean and Forest Aves. $150,000.

Mass., Barnstable—HORTICULTURAL—Cape Cod Horticultural Society, c/o F. Paine, archt., Masonic Temple Bldg., Hyannis, sketches horticultural building, Main St. $150,000 or more funds being raised for same.

Mass., New Bedford—BUSINESS—M. A. Davis, 140 Highland St., Brockton, sketches by L. S. LaBrode, Olympia Bldg., 3 story, 105 x 150 ft., brick, limestone business building, incl. stores, hall and 24 bowling alleys, Acushnet Ave. and Union St. $200,000.

N. J., Colonia — COMMUNITY CENTRE — Corporation forming, c/o J. B. Tiffany, archt., Colonia, sketches 2 story, basement, brick, steel community centre, incl. auditorium, restaurant, dwelling houses. $150,000.

N. J., Newark—RAILROAD STATION—Pennsylvania R.R. Co., L. P. Struble, engr. (Newark improvements), Passenger Bldg., bids late in spring, 1 story, basement, 65 x 250 ft. brick, steel, Market and Canal Sts. $12,000,000. McKim, Mead & White, 101 Park Ave., New York, archts. Gibbs & Hill, Pennsylvania Sta., New York, consult. engrs.

N. Y., Brooklyn—COMMUNITY—J. Shields, 307 Atlantic Ave., will award contract latter part month, 3 story, 60 x 110 ft. community building, Atlantic Ave. and Hoyt St. $150,000. J. P. Boyland, 305 East Kingsbridge Rd., New York, archt. Noted Dec. 3.

N. Y., Brooklyn—MAUSOLEUM—G. B. Webb, archt., 10 East 43rd St., New York, bids after Dec. 15, superstructure mausoleum, for Cemetery of Holy Cross, 75 Green St. $190,000. Noted Aug. 19.

Pa., Phila.—EXCHANGE—J. T. Windrim, archts., 1201 Chestnut St., soon lets contract 2 story, basement, 44 x 115 ft., rein.-con., concrete brick addition, plain found., 54th and Woodland Sts., for Bell Telephone Co., 1835 Arch St.

Tex., San Angelo — MEMORIAL — Robert Massie Memorial Foundation, c/o H. Jackson, Central Natl. Bank Bldg., memorial building. $250,000.

CONTRACTS AWARDED

Mass., Quincy—PASSENGER STATION—New York, New Haven & Hartford R.R. Co., A. P. Russell, vice-pres. and E. E. Oviatt, ch. engr., New Haven, Conn., remodeling Quincy Adams Passenger Station, 1 story, brick, stone, steel, plain, found., to Tredennick-Billings Co., 10 High St., Boston, est. exceeds $150,000; plumbing, to Downey Co., 99 West Dedham St., Boston, electrical work, to Jas. Wilkinson & Co., 128 Olive St., Boston, est. $25,000. Noted Nov. 19.

N. J., Ocean Grove—RESTAURANT—Ocean Grove Camp Meeting Assn., Central Ave., general contract 2 story, basement, brick, steel restaurant and cafeteria, Beach Ave. and Wesley Lake, to H. Summer, 303 Lincoln Ave., Avon. Est. $150,000.

O., Cleveland—BUS TERMINAL—Greyhound Management Co., O. S. Caesar, pres., 1783 East 11th St., remodeling 2 story brick, steel, concrete for bus terminal, East 9th St. and Superior Ave., to Sam W. Emerson Co., 1836 Euclid Ave. Est. $160,000.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Ia., Forest City—ICE HOUSE—Lundberg Co. 100 ton capacity ice house, equipping with refrigeration machinery.

Mass., Brighton—COOLING PLANT—Boston Food Products Co., 532 Commonwealth Ave., sketches brick, concrete, concrete found. $50,000 or more. Private plans. Site not selected.

Mich., Lake Linden—RESEARCH LABORATORY—Calumet & Hecla Consolidated Copper Co., Calumet, Mich., and 25 Bway., New York, research laboratory. $100,000. **Maturity indefinite.**

N. J., Jersey City—PERFUMERY PLANT—V. J. Curcio, 217 Custer Ave., rebuilding 2 story, basement, brick, steel, 217 Custer Ave., destroyed by fire. $40,000. **Maturity soon.** Architect not appointed.

N. Y., Brooklyn—FACTORY—W. Ginsberg, c/o Ex Lax, Inc. (owner), 331 Atlantic Ave., 6 story, manufacturing laboratories, Atlantic Ave. and Bond St., $150,000. V. Mayper, 110 West 40th St., New York, archt. Noted Dec. 3.

N. Y., New York—FACTORY—J. M. Horton Ice Cream Co., 205 East 24th St., sketches by J. E. Ross, 25 West 43rd St., altering 6 story ice cream manufacturing plant, 205-223 East 24th St. $55,000.

Okla., Bristow—REFINERY—Marathon Oil Co., W. W. Fleming, pres., and Mid-Kansas Oil & Gas Co., Philtower Bldg., Tulsa, additional refinery units. $200,000.

Texas—CASINGHEAD GASOLINE PLANT—Gladewater Refining Co., Gladewater, 4,000,000 cu. ft. daily capacity casinghead gasoline plant, east Texas fields. $100,000.

Texas—PUMPING STATION—Phillips Petroleum Co., Bartlesville, Okla., additional stations, increasing capacity present pumping stations on pipe line extending from Borger, incl. considerable machinery. Private plans.

Tex., Bastrop — SAWMILL — Edward Bros. Lumber Co., modern sawmill, incl. complete new equipment, machinery, east of here. Private plans.

Tex., Los Fresnos—LEATHER GOODS FACTORY—Lion Leather Goods Co., c/o D. Petrie, pres., Los Fresnos, 2 story, 40 x 90 ft., brick, rein.-con. plant, plain found. Private plans.

Tex., San Antonio—BAKERY—Wolf Baking Co., c/o P. H. Wolf, 637 South St. Marys St., brick, rein.-con. additional unit, plain found., incl. some modern equipment, machinery. $40,000. Private plans.

Wis., Appleton—PLANT—Badge Printing Co., Pacific and Morrison Sts., plans by LeVee & Gmeinei, 601 West College Ave., 2 story, 92 x 160 ft., rein.-con., brick. $40,000.

Man., Winnipeg—PLANT—National Battery Co., 1728 Robiyn Ave., St. Paul, Minn., G. P. Castner, vice-pres., plant. $100,000.

Ont., Hamilton — BAKERY — Browns Bread Ltd., 426 Eastern Ave., Toronto, plans by S. Comber, 620 Cathcart St., Montreal, Que., 2 story, basement, concrete, brick, steel, Gibson Ave. $60,000.

Ont., Orillia—FLOUR MILL—D. C. Thompson rebuilding flour mill recently destroyed by fire. $50,000 loss. Intended in prices complete equipment in connection with same.

Ont., Toronto—MANUFACTURING—United Typewriter Co. Ltd., 354 Victoria St., subsidiary Underwood-Elliott-Fisher Co., 342 Madison Ave., New York, addition to parts manufacturing plant.

Ont., Windsor—FACTORY—A. S. Boyle Co., W. Whiteside, representative, Canadian Bank of Commerce Bldg., plans by Pennington & Boyde, Security Bldg., 3 story, 60 x 140 ft., pharmaceutical supplies factory, Campbell Ave. and College St. Noted Nov. 19.

BIDS ASKED

Mich., Muskegon—ELECTRIC REFRIGERATION MANUFACTURING — See "Contracts Awarded."

N. J., Newark—FACTORY—J. DiStasio & Co., archts., 136 Liberty St., New York, taking bids general contract 1 story, basement, 160 x 220 ft., brick, steel. Riverside Ave., for Star Electric Motor Co., 140 Miller St. $40,000 or more.

N. J., Nutley—FACTORY—See "Contracts Awarded."

N. Y., Brooklyn — ICE CREAM PLANT — Brookfield Ice Cream Co., lessee, 63rd St. and West 16th Ave., bids about Jan. 1, general and separate contracts on revised plans altering and constructing 2 story ice cream manufacturing plant, 63rd St. and 16th Ave. C. G. Wessel, 139 East 4th St., archt. Noted Dec. 3.

CONTRACTS AWARDED

Calif., Gilroy—CANNERY—Felice & Perrelli, 1 story, rein.-con., wood, to J. Rikshein, Gilroy, $30,000 exclusive of equipment. Noted Nov. 12.

Calif., San Francisco — LAUNDRY — A. Lacrouts, c/o G. A. Berger, archt., 309 Valencia St., 2 story, 26th and Capp Sts., to E. Ellingson, 86 Liberty St., $40,000.

Ind., Evansville—FACTORY — Mead-Johnson Co., 200 South St. Joseph Ave., general contract brick, steel, to M. J. Hoffman Constr. Co., 20 Northwest 4th St. Est. $40,000. Noted Oct. 8.

Ind., Evansville — FACTORY — Servel-Sales, Inc., 231 South La Salle St., Chicago, Ill., rein.-con., brick, steel, to M. J. Hoffman Constr. Co., 20 Northwest 4th St. Est. $40,000.

Ind., Muncie—FACTORY—Indiana Steel Wire Co., 1 story, 60 x 280 ft., rein.-con., brick, steel, to Albert Glaser, 610 South Jefferson St. Est. $40,000.

Ia., Cedar Rapids—FACTORY—Century Eng. Corp., 213 17th Ave. S. E., 1 story, 60 x 140 ft. factory, to O. Klassen, 1826 East Ave. N. W.

Mass., Chicopee—FACTORY—Palmer Steel Co., Inc., 1694 Main St., Springfield, 1 story, 60 x 360 ft. and 1 story, 80 x 160 ft., brick, steel factory units, Meadow St. To exceed $40,000. Owner builds.

Mich., Muskegon—ELECTRIC REFRIGERATION MANUFACTURING—Alaska Refrigerator Co., Muskegon, subsidiary Norge Corp., 7601 Central St., Detroit, re-equipping electric refrigeration manufacturing plant, day labor and separate contracts. To exceed $100,000.

N. J., Asbury Park—ICE PLANT—S. Poluso, Lincoln Pl., 1 story, basement, brick, steel, rein.-con., Lincoln Pl., to W. A. Taylor, 1 Lincoln Pl. Est. $40,000.

N. J., Millville—HOSIERY MILL—Millville Hosiery Co., 1 story, basement, 107 x 122 ft., brick, to G. Kessler Co., 1733 North Marine St., Phila., Pa. Est. $40,000. Noted Oct. 22.

N. J., Nutley—FACTORY—George Swan & Co., 500 Kingsland Rd., 1 story, basement, brick, steel, Kingsland Rd., separate contracts. $40,000. Private plans.

O., Ravenna—FACTORY—Cleveland Worsted Mills, 6114 Broadway, Cleveland, 1 story, con-

Factories and Mills (Continued)

crete, brick, steel, to P. L. Frank Constr. Co., Ravenna, $40,000.

Tex., Elsa—CITRUS PACKING PLANT—Southern Pacific Ry. Co., G. W. Boschke, ch. engr. System, San Francisco, Calif., 2 story, 40 x 50 ft., rein.-con., plain found., to Rio Grande Constr. Co., San Benito.

Va., Charlottesville—TEXTILE MILL—Lockwood & Greene, engrs., 9 West 3rd St., Charlotte, N. C., general contract 4 story, 90 x 182 ft., brick, steel, to Allen J. Saville, Inc., Electric Bldg., Richmond, for Charlottesville Woolen Mills. Noted Nov. 27.

Va., Goshen—TEXTILE MILL—Lockwood & Greene, engrs., 9 West 3rd St., Charlotte, N. C., constructing addition to mill, to J. Pettijohn, Lynchburg, for Stillwater Worsted Mills. Noted Nov. 27.

Wis., Appleton—PLANT—Le Vee & Gmeinei, archts., 601 West College Ave., 2 story, 48 x 50 ft., rein.-con., brick, to G. Ashman, 206 South Memorial Dr., for Appleton Pure Milk Co., 714 West Washington St. $40,000. Noted Nov. 12.

Ont., Renfrew—ABATTOIR—Ottawa Valley Packing Co., general contract 2 story, basement, brick, concrete, to M. J. Sulphur, Lisgar St. Est. $100,000.

GARAGES

PROPOSED WORK

Calif., Los Angeles—See "Warehouses."

Mass., Springfield—General Electric Co., E. A. Wagner, genl. mgr., Pittsfield, 2 story, basement, brick, concrete service and sales service building, King St. $40,000 or more. Private plans.

Mass., Waltham—Woodward & Tyler, 844 Main St., 1 story, brick, concrete super-service station, concrete found., Main and Bank Sts. $50,000.

N. H., Milford—Souhegan Motor Co., c/o A. W. Osberg, archt., 795 Elm St., Manchester, revised plans and takes bids in January, altering and constructing 1 story, basement, 72 x 110 ft., brick garage addition. $40,000. Noted June 25.

N. J., Jersey City—Lafayette-Greenville Bus Owners Assn., and Greenville Bus Co., 77 Seaview Ave., sketches by H. Adelman, 437 Bway., Bayonne, 1 story, basement, brick, steel garage and bus terminal, Gates Ave. and Merritt St. $150,000. Noted Dec. 3.

N. Y., New York—Boyerton Burial Casket Co., 39 West 60th St., sketches by Bruit & Brown, 342 Madison Ave., garage, funeral chapel, mortuary, Webster Ave. and 188th St. $85,000.

BIDS ASKED

Minn., St. Paul—Dec. 22, by C. R. Erickson, comrs. Purchase, State Capitol, highway patrol station and garages at Brainerd and Owatonna, for State Hy. Dpt.

CONTRACTS AWARDED

Mass., Amherst—H. B. Ketchen, 11 East Pleasant St., 1 story, concrete, steel super-service station, Pleasant St., to G. S. Allen, 110 South Pleasant St. Est. $45,000. Noted Dec. 3.

Mass., Danvers — G. Stahler, 15 High St., Middletown, 1 story, 60 x 100 ft., brick, rein.-con., steel garage, showroom, plain found., to Pitman & Brown Co., Washington St., Salem. Est. $40,000. Noted Nov. 5.

R. I., Providence—J. J. Finnegan, 134 Sharon St., 1 story, concrete, brick, steel service garage, 110 West Park St., to E. Turgeon, 36 Exchange Et. Est. $40,000-$50,000. Noted Oct. 29, under "Contracts Awarded."

SHOPS AND FOUNDRIES

PROPOSED WORK

Mass., Northampton—SHOPS—Clark Institute for Deaf & Dumb, sketches by Fechheimer & Ihorst, Provident Bank Bldg., Cincinnati, O., two 2 story, 40 x 80 ft., brick, hollow tile, limestone school shops. $70,000.

N. J., Newark — SHOP and OFFICE — C. Jeffreys, 38 Liberty St., plans by A. Peter, 207 Market St., 1 story, basement, brick, steel, Liberty St. Est. $40,000.

POWER PLANTS

PROPOSED WORK

Ia., Grand Junction—Election Jan. 7, to consider construction municipal power plant. $85,000. O. V. Blaylock, city clk.

Ia., Mason City—Federal Constr. Co., Minneapolis, Minn., power plant. $125,000. J. E. Decker & Sons Packing Co., Mason City, lessee.

Kan., Anthony—City engaged Black & Veatch, consult. engrs., Mutual Bldg., Kansas City, Mo., to make report, eight plant and waterworks improvements. **Maturity in spring.**

Kan., Topeka—Black & Veach, consult. engrs., Mutual Bldg., Kansas City, Mo., making study pumping and electric generation capacity of municipal power plant with view of ascertaining additional generating equipment, for City.

Mass., South Hadley—Mount Holyoke College, M. E. Wooley, pres., sketches by architect at office H. French, 210 South St., Boston, 2 story, basement, 50 x 100 ft., brick, concrete boiler house, also three 350 hp. water tube boilers. $200,000.

Mich., Battle Creek—Kellog Co., plans by Albert Kahn, 1000 Marquette Bldg., Detroit, brick, steel, rein.-con. power plant for cereal factory, plain found. $75,000.

Neb., Ord—City Council engaged Black & Veatch, consult. engrs., Mutual Bldg., Kansas City, Mo., to make report outlining size and type power and light and water plant additions. **Maturity in spring.**

Okla., Seminole — City Council preliminary plans municipal electric light plant. $60,000. R. N. Geer, Seminole, engr.

Tex., Tahoka—Continental Chemical Co., c/o P. J. McIntosh, genl. mgr., Thomas Bldg., Dallas, soon lets contract five 1 story, brick, rein.-con. buildings, and 5 residences, 24 story, 70 ft. high evaporating building, no roof, incl. pumping equipment, levee work and 28 mi. railroad to plant, near here. $1,600,000. Private plans, A. G. Shuttler, Chicago, Ill., assoc. archt. W. D. Alt, 301-D Thomas Bldg., engr. Noted Dec. 10.

Vt., Burlington—Home for Aged Women, 272 Church St., plans by F. L. Austin, 240 College St., brick heating plant, Church St. $450,000.

CONTRACTS AWARDED

Ill., Chicago—Chicago Union Station Co., 1st unit power house equipped with water tube boilers, forced draft, chain grate stokers, 1,600 hp. boilers, (16,000 hp. total capacity) on 14,375 sq.ft. site between Taylor St. and Roosevelt Rd., to serve Union Station, post office, adjacent railway facilities, to John Griffiths & Sons Co., 228 North La Salle St.; boilers to Foster Wheeler Corp., 20 North Wacker Dr.; conveyors, to Link-Belt Co., 910 South Michigan Ave. Total est. $1,500,000. Work started.

N. J., Scotch Plains—Union Co., Court House, general contract altering and constructing 1 story, basement, brick, steel power house and garage addition, Bonnie Burns Sanitarium, to T. F. Conroy, 95 Tiffany Pl., Maplewood; plumbing, to A. Arace & Sons, 640 3rd Ave., Elizabeth; electrical work, to H. Schenck, 32 Meadowbrook Rd., Maplewood; steel, to Harco Steel Co., 1180 East Broad St., Elizabeth; sheet metal work, to M. H. Donovan, 31 Tillinghast St., Newark. Est. $40,000. Noted Nov. 13.

Tex., Borger—City, c/o J. R. Miller, mayor, municipal natural gasoline plant, incl. 40,000 lin.ft. gas mains, laterals, booster plant, to Jos. A. Greenspon & Sons, 3130 North Hall St., St. Louis, Mo., $125,000. Noted Nov. 12.

WAREHOUSES

PROPOSED WORK

Calif., Los Angeles—Loose-Wiles Biscuit Co., 811 Commerce St., Kansas City, Mo., plans by C. Beelman, 1019 Union Bank Bldg., 1 story, 140 x 220 ft., warehouse and garage, steel frame, steel sash, terra cotta, concrete, plate glass, rolling doors, loading platforms, decomposed granite paving, wire fence, steel ladder, settling tank, 600 Gage Ave. $40,000.

Calif., Pasadena — City Comn., plans by Marston & Maybury, 25 South Euclid Ave., 1 story, incl. machine shop, oil storage building, repair shop, general warehouse, 1103 Glenn Ave. $100,000. B. De Lanty, City Hall, engr.

Conn., New Britain—Hardware City Storage Co., 242 Main St., plans by Kingsley Serv. Co., 103 West 125th St., New York, and takes general contract bids late in June, 6 story, basement, 50 x 100 ft., brick, steel storage warehouse. Noted July 23.

Mass., Saugus—Owner, c/o R. S. Robie & C. A. Allen, 6 Belvidere St., Boston, 30 m.g. bulk oil plant, Saugus Marsh. $1,000,000. Private plans.

N. Y., New York—P. Garrick, lessee, 620 West 52nd St., altering 4 story, 25 x 100 ft. farm products building into storage warehouse, 532 West 48th St. $40,000.

N. Y., New York—Romike Realty Corp., J. C. Weil, 507 West 125th St., sketches by Jardine, Murdock & Wright, 347 Madison Ave., 72 x 100 ft. loft and storage, 1340 Amsterdam Ave. $40,000. Weil Bros. Hardware & Plumbing Co., lessee. Noted Nov. 5.

N. C., Greensboro—Swift & Co., Packers and Exchange Aves., Chicago, Ill., refrigerated storage plant. $40,000.

Ont., St. Catherines — St. Catherines Cold Storage Co., Davidson St., pre-cooling central packing and cold storage plant. $100,000.

CONTRACTS AWARDED

Calif., Los Angeles — Safeway Stores, Inc., 1925 East Vernon Ave., 1 story, 155 x 326 ft., steel, brick warehouse, steel and wood rolling doors, small refrigerating system, steel sash, wrecking old building, 1925 East Vernon Ave., to Clinton Constr. Co., 1103 Arcade Bldg. Est. $100,000.

Md., Baltimore—American Stores Co., 242 North 19th St., distribution plant, to Turner Constr. Co., Graybar Bldg., New York. Est. $125,000. Noted Dec. 10.

Mass., Malden—F. T. Niles, 40 Upland St., Melrose, 1 story, concrete, steel warehouse, 237 Commercial St., to F. E. Yeomans, 10 Newbern Ave., Medford. Est. $40,000.

Mass., Newton—Rohmer Wool Scouring & Carbonizing Co., 149 California St., altering and constructing 2 story, steel storage building addition, to Priggin Steel Building Co., Carlton St., Cambridge.

N. J., Trenton—City Comrs., general contract transit freight shed, to W. C. Ehret, Academy St., $45,747; structural steel, to McClintic-Marshall Co., 39 Bway., New York, $20,095; drain, to E. Giovachino, Paulsboro, $15,350; plumbing and water lines, to Burns, Lane & Richardson, 41 Adams St., $4,226; electrical work, to P. C. Peifer, 120 West State St., $1,256; heating, to P. S. Slack, 219 Perry St., $1,271. Grand total $87,985. Noted Nov. 25.

Public Construction Projects Held Up in Massachusetts

62 Projects Worth $26,000,000

Public Buildings to Cost $150,000 or More

SCHOOLS

Milton	No funds; $300,000
Plymouth	Indefinite; $250,000
Raynham	Indefinite
Revere	Sketches made; $300,000
Roxbury	Plans incomplete; $1,500,000
Saugus	Preliminary plans; $400,000
Swampscott	Voted postponement for 1931; $250,000
Waltham	Plans incomplete
Waltham	Architect not selected; $1,000,000
Wellesley	Architect not selected
Wilmington	Indefinite

State school for feebleminded; site not selected
High School, West Roxbury; Indefinite
Cambridge, 2 high school units; indefinite; $500,000
Andover Indefinite
Jamaica Plain Indefinite
Malden Preliminary

OTHER BUILDINGS

North Adams, library, $250,000
Waltham, library, Mass. Agric. College; indefinite; $175,000
State police barracks at Middleboro or Bridgewater; site not selected
Boston, supreme court; preliminary
Boston, fire station Back Bay district; indefinite
Boston, municipal building; site not selected; $400,000
Boston, memorial in Back Bay Fens; architect not selected; $1,000,000
Boston, police station Hanover and Joy Streets; indefinite; $350,000
Boston, police station Lagrange and Dedham Streets; indefinite; $350,000
Boston, police station Richmond and North Streets; preliminary; $350,000
Cambridge, memorial; indefinite; $1,000,000
Arlington Heights library; indefinite
Charlestown, municipal building; indefinite; $400,000
Chelsea, soldiers home; preliminary; $300,000
Grafton, hospital unit; indefinite
Lakeville, infirmary; indefinite
Natick, courthouse; indefinite; $150,000

WATER-WORKS

Amesbury	Reservoir at PowWow Hill; indefinite; $100,000
Medford	Mains; no appropriation; $65,000
Bourne	System for Buzzards Bay; insufficient funds; $15,000
Norwell	System; indefinite; $15,000
Paxton	System; insufficient funds; $15,000
Raynham	System; insufficient funds; $200,000

SEWERS

Barnstable	Sewage disposal; no funds; $250,000
Mattapoisett	System; indefinite; $110,000 approp

BRIDGES

Mystic River,	Charlestown-Chelsea; no funds, $150,000
Medford	State over Mystic River from Revere; indefinite; $400,000
Framingham	State, over Sudbury; indefinite; $25,000
Lynn	State, over Saugus; plans not ready; $25,000
Pt. of Pines	State, Lynn-Revere; site not selected; $850,000
Boston	State, to Hull; indefinite; $25,000

GRADE CROSSINGS, STATE AND B. & M. R.R.

Ashburton	Overpass, B. & M., no appropriation; $50,000
Millis and East Brewster,	2 overpasses; no appropriation; $110,000
Waltham, Winchendon, Newbury;	3 overpasses, no appropriation; $730,000
Bernardston-Northfield;	overpass; no appropriation $25,000
Ayer	Underpass; indefinite; $300,000
Mansfield	Central St., N. Y., N. H., & H.; no funds, $2,000,000
Cheshire	Overpass, N. Y. Central; indefinite

Construction Exclusive of Buildings

MISCELLANEOUS CONSTRUCTION

Boston	Filling South Bay and Roxbury Canal; preliminary; $7,000,000
Boston	Stadium, Dunbar Ave.; postponed; $100,000
Bourne	State pier; action delayed; $25,000
Fall River	State pier; site not selected; $40,000
Boston	Playground at Rogers Park; no funds; $25,000
Boston	Reconstructing North End playground; delayed; $25,000
Boston	Playground, Gallivan's Grove, West Roxbury; no funds; $100,000
Boston	State park along Charles River embankment; no appropriation; $2,000,000

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See proposal advertising on page 58

Stores (Continued)

B. C., Vancouver—Woodwards, Ltd., Hastings and Abbott Sts., plans by Dominion Constr. Co., Ltd., archts. and engrs., 509 Richards St., and bids about Dec. 31, general contract 3 story, 2 basement, 50 x 132 ft., steel, concrete, brick, rein.-con., store, plain found., Cordova St. $150,000. Structural steel contract awarded to Western Bridge Co., Ltd., 1st Ave. and Columbia St., $25,000.

N. J., Bernardsville—Fischer & Brown, archts., 102 North Ave., Plainfield, soon lets general contract 1 and 2 story, basement, brick, steel store, apartment, Mine Brook Rd., for John Urh, 71 Claremont Rd. $150,000.

N. J., Long Branch—J. Heleotis, 904 Bergh Ave., Arbury Park, sketches altering and constructing 3 story, basement, brick, steel store, apartment addition, Bway. $150,000.

N. J., Newark—H. Stevens, 480 Central Ave., 2 story, basement, brick, steel store, apartment, 18th Ave. $150,000. **Maturity soon.**

BIDS ASKED

Ill., Chicago—Klee Bros., 1200 Milwaukee Ave., taking bids general contract 3 story, limestone, terra cotta, store, office Belmont and Ashland Aves. A. Epstein, 2001 West Pershing Rd., engr. Noted Sept. 18.

N. J., Asbury Park—C. B. Cook, archt., 505 Bond St., general contract bids about Jan. 15, on revised plans 2 story, basement, brick, steel store, office, for J. Ackerman, 404 Asbury Ave. $150,000. Noted Oct. 22.

N. J., Plainfield—C. C. Gordon, 437 North Ave., taking bids general contract 3 story, basement, 70 x 100 ft., brick, steel store, office, East Front St. $150,000. W. L. Finne, 124 West Jersey St., Elizabeth, archt. Noted Dec. 3.

N. J., Union — H. Forman, 103 Broad St., Elizabeth, taking bids general contract 2 story, basement, brick, steel store. $150,000. Poggi & Bragdon, 275 Morris Ave., Elizabeth, archts.

CONTRACTS AWARDED

N. Y., New York—Corporation, c/o S. Lerber, 2043 Holland Ave., 6 story, store, apartment, Bronxdale Ave. and Austin Pl., to Lerber Constr. Co., 2043 Holland Ave. Est. $325,000. Contractor soon lets separate contracts.

PUBLIC

PROPOSED WORK

Calif., Sacramento—CITY HALL—City fireproof city hall annex. $150,000. Architect not appointed.

Conn., Rocky Hill—VETERANS HOME—State, State Veterans Home Comn., Hartford, veterans home at Rocky Hill. $250,000. Wynne & Hahn, 902 Chapel St., New Haven, engrs. Architect not appointed.

Mass., Nantucket—OFFICE—Town and Nantucket Co., plans by F. L. Ackerman, 25 West 44th St., New York, town and county building. $160,000. Bids on excavation, etc., in March or later. Noted Nov. 19.

N. J., Jersey City—LIBRARY—Bd. Trustees Free Public Library, 472 Jersey Ave., 3 story, basement, brick, steel library. $200,000. **Maturity in April.** Architect not appointed.

N. Y., Brooklyn—HALL of RECORDS—H. Hesterberg, pres., Brooklyn Boro, Boro Hall, hall of records, vicinity Boro Hall. To exceed $250,000. **Maturity indefinite.** No appropriation.

Okla., Atoka — REFORMATORY — State Bd. Affairs, Capitol Bldg., Oklahoma City, sketches by Layton, Hicks & Forsythe, Braniff Bldg., Oklahoma City, reformatory. $450,000.

R. I., Providence—LIBRARY—Providence Public Library Assn., c/o A. Harkness, archt., Industrial Trust Bldg., 1 and 2 story, basement, brick, Candace St. $150,000.

Tex., Longview—COURT HOUSE, etc.—Gregg Co., c/o W. R. Hughes, judge, 5 story, 93 x 110 ft., light brick, terra cotta, steel courthouse and jail. $200,000. Date for closing bids (Dec. 21), temporarily postponed, awaiting approval of bonds. Voelker & Dixon, Perkins-Snider Bldg., Wichita Falls, archts.. Noted Dec. 3, under "Bids Asked."

BIDS ASKED

N. Y., Elmira—CELL BLOCKS—Dec. 29, by Commissioner Correction, State Office Bldg., Albany, remodeling interior Cell Blocks A and B, Elmira State Prison; adv. E.N.-R. Dec. 17. Noted Nov. 26.

N. J., South Belmar—BORO HALL, etc.—Bd. Boro Council, bids about Jan. 22, 2 story, basement, brick, steel boro hall, police headquarters, $150,000. H. R. Seymour, 512 McClellan Ave., Long Branch, archt. Noted Sept. 24.

N. Y., Kingston—ARMORY—Dec. 29, by Adjutant General, Div. Military & Naval Affairs, Albany, completing contract for construction armory for field artillery; adv. E.N.-R. Dec. 17.

CONTRACTS AWARDED

Mass., Boston—OFFICE—Dpt. P. Wks., Commonwealth of Massachusetts, 8 story, basement, 90 x 365 ft., brick, limestone, steel, plain found., to F. V. Warren Co., 15th and Locust Sts., Phila., Pa. $1,199,489. Noted Nov. 12.

Mass., Tewksbury—EMPLOYEES—Dpt. P. Welfare, Commonwealth of Massachusetts, State House, Boston, to Allan A. Gillis Constr. Co., 313 Washington St., Newton Centre, employees building $74,000, men's unit $70,000, superintendent's cottage $12,000. Grand total $156,000. Noted Nov. 12.

Mass., Wrentham—EMPLOYEES DORMITORY Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, basement, 45 x 165 ft., brick, to Crane Constr. Co., Inc., 80 Boylston St., Boston. $104,300. Noted Nov. 12.

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UNCLASSIFIED

PROPOSED WORK

Calif., Los Angeles—EXCHANGE—Southern California Telephone Co., 740 South Oliver St., 3 story, steel exchange building to be known as Angelus Telephone Building, 3434 East 4th St. $1,100,000, incl. equipment. **Maturity about Jan. 1.**

Me., Portland—EXCHANGE—New England Telephone & Telegraph Co., 50 Oliver St., Boston, Mass., plans by Densmore, Le Clear & Robbins, Park Sq. Bldg., Boston, Mass., and soon takes bids 3 story, basement, brick, steel, plain found. $150,000. Noted Oct. 29.

Me., Portland—HOME—Caldwell Post American Legion, V. Stevens, in charge, sketches by Miller & Beal, Inc., 465 Congress St., American Legion Home, Ocean and Forest Aves. $150,000.

Mass., Barnstable—HORTICULTURAL—Cape Cod Horticultural Society, c/o F. Paine, archt., Masonic Temple Bldg., Hyannis, sketches horticultural building, Main St. $150,000 or more funds being raised for same.

Mass., New Bedford—BUSINESS—M. A. Davis, 140 Highland St., Brockton, sketches by L. S. LaBrode, Olympia Bldg., 3 story, 105 x 150 ft., brick, limestone business building, incl. stores, hall and 24 bowling alleys, Acushnet Ave. and Union St. $200,000.

N. J., Colonia — COMMUNITY CENTRE — Corporation forming, c/o J. B. Tiffany, archt., Colonia, sketches 2 story, basement, brick, steel community centre, incl. auditorium, restaurant, dwelling houses. $150,000.

N. J., Newark—RAILROAD STATION—Pennsylvania R.R. Co., L. P. Struble, engr. (Newark improvements), Passenger Bldg., bids late in spring, 1 story, basement, 65 x 250 ft. brick, steel. Market and Canal Sts. $12,000,000. McKim, Mead & White, 101 Park Ave., New York, archts. Gibbs & Hill, Pennsylvania Sta., New York, consult. engrs.

N. Y., Brooklyn—COMMUNITY—J. Shields, 307 Atlantic Ave., will award contract latter part month, 3 story, 60 x 110 ft. community building, Atlantic Ave. and Hoyt St. $150,000. J. P. Boyland, 305 East Kingsbridge Rd., New York, archt. Noted Dec. 3.

N. Y., Brooklyn—MAUSOLEUM—G. B. Webb, archt., 10 East 43rd St., New York, bids after Dec. 15, superstructure mausoleum, for Cemetery of Holy Cross, 75 Green St. $190,000. Noted Aug. 19.

Pa., Phila.—EXCHANGE—J. T. Windrim, archts., 1201 Chestnut St., soon lets contract 2 story, basement, 44 x 115 ft., rein.-con., concrete brick addition, plain found., 54th and Woodland Sts., for Bell Telephone Co., 1835 Arch St.

Tex., San Angelo — MEMORIAL — Robert Massie Memorial Foundation, c/o H. Jackson, Central Natl. Bank Bldg., memorial building. $250,000.

CONTRACTS AWARDED

Mass., Quincy—PASSENGER STATION—New York, New Haven & Hartford R.R. Co., A. P. Russell, vice-pres. and E. E. Oviatt, ch. engr., New Haven, Conn., remodeling Quincy Adams Passenger Station, 1 story, brick, stone, steel, plain found., to Tredennick-Bennings Co., 10 High St., Boston, est. exceeds $150,000; plumbing, to Downey Co., 99 West Dedham St., Boston, electrical work, to Jas. Wilkinson & Co., 128 Olive St., Boston, est. $25,000. Noted Nov. 19.

N. J., Ocean Grove—RESTAURANT—Ocean Grove Camp Meeting Assn., Central Ave., general contract 2 story, basement, brick, steel restaurant and cafeteria, Beach Ave. and Wesley Lake, to H. Summer, 303 Lincoln Ave., Avon. Est. $150,000.

O., Cleveland—BUS TERMINAL—Greyhound Management Co., O. S. Caesar, pres., 1783 East 11th St., remodeling 2 story brick, steel, concrete for bus terminal, East 9th St. and Superior Ave., to Sam W. Emerson Co., 1836 Euclid Ave. Est. $160,000.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Ia., Forest City—ICE HOUSE—Lundberg Co. 100 ton capacity ice house, equipping with refrigeration machinery.

Mass., Brighton—COOLING PLANT—Boston Food Products Co., 532 Commonwealth Ave., sketches brick, concrete, concrete found. $50,000 or more. Private plans. Site not selected.

Mich., Lake Linden—RESEARCH LABORATORY—Calumet & Hecla Consolidated Copper Co., Calumet, Mich., and 25 Bway., New York, research laboratory. $100,000. **Maturity indefinite.**

N. J., Jersey City—PERFUMERY PLANT—V. J. Curcio, 217 Custer Ave., rebuilding 2 story, basement, brick, steel, 217 Custer Ave., destroyed by fire. $40,000. **Maturity soon.** Architect not appointed.

N. Y., Brooklyn—FACTORY—W. Ginsberg, c/o Ex Lax, Inc. (owner), 331 Atlantic Ave., 6 story, manufacturing laboratories, Atlantic Ave. and Bond St. $150,000. V. Mayper, 110 West 40th St., New York, archt. Noted Dec. 3.

N. Y., New York—FACTORY—J. M. Horton Ice Cream Co., 205 East 24th St., sketches by J. E. Ross, 25 West 43rd St., altering 6 story ice cream manufacturing plant, 205-223 East 24th St. $55,000.

Okla., Bristow—REFINERY—Marathon Oil Co., W. W. Fleming, pres., and Mid-Kansas Oil & Gas Co., Philtower Bldg., Tulsa, additional refinery units. $200,000.

Texas—CASINGHEAD GASOLINE PLANT—Gladewater Refining Co., Gladewater, 4,000,000 cu. ft. daily capacity casinghead gasoline plant, east Texas fields. $100,000.

Texas—PUMPING STATION—Phillips Petroleum Co., Bartlesville, Okla., additional stations, increasing capacity present pumping stations on pipe line extending from Borger, incl. considerable machinery. Private plans.

Tex., Bastrop — SAWMILL — Edward Bros. Lumber Co., modern sawmill, incl. complete new equipment, machinery, east of here. Private plans.

Tex., Los Fresnos—LEATHER GOODS FACTORY—Lion Leather Goods Co., c/o D. Petrie, pres., Los Fresnos, 2 story, 40 x 90 ft., brick, rein.-con. plant, plain found. Private plans.

Tex., San Antonio—BAKERY—Wolf Baking Co., c/o P. H. Wolf, 637 South St. Marys St., brick, rein.-con. additional unit, plain found., incl. some modern equipment, machinery. $40,000. Private plans.

Wis., Appleton—PLANT—Badge Printing Co., Pacific and Morrison Sts., plans by LeVee & Gmeinei, 601 West College Ave., 2 story, 92 x 160 ft., rein.-con., brick. $40,000.

Man., Winnipeg—PLANT—National Battery Co., 1728 Robyn Ave., St. Paul, Minn., G. P. Castner, vice-pres., plant. $100,000.

Ont., Hamilton — BAKERY — Browns Bread Ltd., 426 Eastern Ave., Toronto, plans by S. Comber, 620 Cathcart St., Montreal, Que., 2 story, basement, concrete, brick, steel, Gibson Ave. $60,000.

Ont., Orillia—FLOUR MILL—D. C. Thompson rebuilding flour mill recently destroyed by fire. $50,000 loss. Intended in prices complete equipment in connection with same.

Ont., Toronto—MANUFACTURING—United Typewriter Co. Ltd., 354 Victoria St., subsidiary Underwood-Elliott-Fisher Co., 342 Madison Ave., New York, addition to parts manufacturing plant.

Ont., Windsor—FACTORY—A. S. Boyle Co., W. Whiteside, representative, Canadian Bank of Commerce Bldg., plans by Pennington & Boyde, Security Bldg., 3 story, 60 x 140 ft., pharmaceutical supplies factory, Campbell Ave. and College St. Noted Nov. 19.

BIDS ASKED

Mich., Muskegon—ELECTRIC REFRIGERATION MANUFACTURING — See "Contracts Awarded."

N. J., Newark—FACTORY—J. DiStasio & Co., archts., 136 Liberty St., New York, taking bids general contract 1 story, basement, 160 x 220 ft., brick, steel. Riverside Ave., for Star Electric Motor Co., 140 Miller St. $40,000 or more.

N. J., Nutley—FACTORY—See "Contracts Awarded."

N. Y., Brooklyn — ICE CREAM PLANT — Brookfield Ice Cream Co., lessee, 63rd St. and West 16th Ave., bids about Jan. 1, general and separate contracts on revised plans altering and constructing 2 story ice cream manufacturing plant, 63rd St. and 16th Ave. C. G. Wessel, 139 East 4th St., archt. Noted Dec. 3.

CONTRACTS AWARDED

Calif., Gilroy—CANNERY—Felice & Perrelli, 1 story, rein.-con., wood, to J. Rikshein, Gilroy, $30,000 exclusive of equipment. Noted Nov. 12.

Calif., San Francisco — LAUNDRY — A. Lacrouts, c/o G. A. Berger, archt., 309 Valencia St., 2 story, 26th and Capp Sts., to E. Ellingson, 86 Liberty St., $40,000.

Ind., Evansville—FACTORY — Mead-Johnson Co., 200 South St. Joseph Ave., general contract brick, steel, to M. J. Hoffman Constr. Co., 20 Northwest 4th St. Est. $40,000. Noted Oct. 8.

Ind., Evansville — FACTORY — Servel-Sales, Inc., 231 South La Salle St., Chicago, Ill., rein.-con., brick, steel, to M. J. Hoffman Constr. Co., 20 Northwest 4th St. Est. $40,000.

Ind., Muncie—FACTORY—Indiana Steel Wire Co., 1 story, 60 x 280 ft., rein.-con., brick, steel, to Albert Glaser, 610 South Jefferson St. Est. $40,000.

Ia., Cedar Rapids—FACTORY—Century Eng. Corp., 213 17th Ave. S. E., 1 story, 60 x 140 ft. factory, to O. Klassen, 1826 East Ave. N. W.

Mass., Chicopee—FACTORY—Palmer Steel Co., Inc., 1694 Main St., Springfield, 1 story, 60 x 360 ft. and 1 story, 80 x 160 ft., brick, steel factory units, Meadow St. To exceed $40,000. Owner builds.

Mich., Muskegon—ELECTRIC REFRIGERATION MANUFACTURING—Alaska Refrigerator Co., Muskegon, subsidiary Norge Corp., 7601 Central St., Detroit, re-equipping electric refrigeration manufacturing plant, day labor and separate contracts. To exceed $100,000.

N. J., Asbury Park—ICE PLANT—S. Poluso, Lincoln Pl., 1 story, basement, brick, steel, rein.-con., Lincoln Pl., to W. A. Taylor, 1 Lincoln Pl. Est. $40,000.

N. J., Millville—HOSIERY MILL—Millville Hosiery Co., 1 story, basement, 107 x 122 ft., brick, to G. Kessler Co., 1733 North Marine St., Phila., Pa. Est. $40,000. Noted Oct. 22.

N. J., Nutley—FACTORY—George Swan & Co., 500 Kingsland Rd., 1 story, basement, brick, steel, Kingsland Rd., separate contracts. $40,000. Private plans.

O., Ravenna—FACTORY—Cleveland Worsted Mills, 6114 Broadway, Cleveland, 1 story, con-

Factories and Mills (Continued)

crete, brick, steel, to P. L. Frank Constr. Co., Ravenna, $40,000.

Tex., Elsa—CITRUS PACKING PLANT—Southern Pacific Ry. Co., G. W. Boschke, ch. engr. System, San Francisco, Calif., 2 story, 40 x 50 ft., rein.-con., plain found., to Rio Grande Constr. Co., San Benito.

Va., Charlottesville—TEXTILE MILL—Lockwood & Greene, engrs., 9 West 3rd St., Charlotte, N. C., general contract 4 story, 90 x 182 ft., brick, steel, to Allen J. Saville, Inc., Electric Bldg., Richmond, for Charlottesville Woolen Mills. Noted Nov. 27.

Va., Goshen—TEXTILE MILL—Lockwood & Greene, engrs., 9 West 3rd St., Charlotte, N. C., constructing addition to mill, to J. Pettijohn, Lynchburg, for Stillwater Worsted Mills. Noted Nov. 27.

Wis., Appleton—PLANT—Le Vee & Gmeinei, archts., 601 West College Ave., 2 story, 48 x 50 ft., rein.-con., brick, to G. Ashman, 206 South Memorial Dr., for Appleton Pure Milk Co., 714 West Washington St. $40,000. Noted Nov. 12.

Ont., Renfrew—ABATTOIR—Ottawa Valley Packing Co., general contract 2 story, basement, brick, concrete, to M. J. Sulphur, Lisgar St. Est. $100,000.

GARAGES

PROPOSED WORK

Calif., Los Angeles—See "Warehouses."

Mass., Springfield—General Electric Co., E. A. Wagner, genl. mgr., Pittsfield, 2 story, basement, brick, concrete service and sales service building, King St. $40,000 or more. Private plans.

Mass., Waltham—Woodward & Tyler, 844 Main St., 1 story, brick, concrete super-service station, concrete found., Main and Bank Sts. $50,000.

N. H., Milford—Souhegan Motor Co., c/o A. W. Osberg, archt., 795 Elm St., Manchester, revised plans and takes bids in January, altering and constructing 1 story, basement, 72 x 110 ft., brick garage addition. $40,000. Noted June 25.

N. J., Jersey City—Lafayette-Greenville Bus Owners Assn., and Greenville Bus Co., 77 Seaview Ave., sketches by H. Adelman, 437 Bway., Bayonne, 1 story, basement, brick, steel garage and bus terminal, Gates Ave. and Merritt St. $150,000. Noted Dec. 3.

N. Y., New York—Boyerton Burial Casket Co., 39 West 60th St., sketches by Bruit & Brown, 342 Madison Ave., garage, funeral chapel, mortuary, Webster Ave. and 188th St. $85,000.

BIDS ASKED

Minn., St. Paul—Dec. 22, by C. R. Erickson, comrs. Purchase, State Capitol, highway patrol station and garages at Brainerd and Owatonna, for State Hy. Dpt.

CONTRACTS AWARDED

Mass., Amherst—H. B. Ketchen, 11 East Pleasant St., 1 story, concrete, steel super-service station, Pleasant St., to G. S. Allen, 110 South Pleasant St. Est. $45,000. Noted Dec. 3.

Mass., Danvers — G. Stahler, 15 High St., Middletown, 1 story, 60 x 100 ft., brick, rein.-con., steel garage, showroom, plain found., to Pitman & Brown Co., Washington St., Salem. Est. $40,000. Noted Nov. 5.

R. I., Providence—J. J. Finnegan, 134 Sharon St., 1 story, concrete, brick, steel service garage, 110 West Park St., to E. Turgeon, 36 Exchange Et. Est. $40,000-$50,000. Noted Oct. 29, under "Contracts Awarded."

SHOPS AND FOUNDRIES

PROPOSED WORK

Mass., Northampton—SHOPS—Clark Institute for Deaf & Dumb, sketches by Fechheimer & Ihorst, Provident Bank Bldg., Cincinnati, O., two 2 story, 40 x 80 ft., brick, hollow tile, limestone school shops. $70,000.

N. J., Newark — SHOP and OFFICE — C. Jeffreys, 38 Liberty St., plans by A. Peter, 207 Market St., 1 story, basement, brick, steel, Liberty St. Est. $40,000.

POWER PLANTS

PROPOSED WORK

Ia., Grand Junction—Election Jan. 7, to consider construction municipal power plant. $85,000. O. V. Blaylock, city clk.

Ia., Mason City—Federal Constr. Co., Minneapolis, Minn., power plant. $125,000. J. E. Decker & Sons Packing Co., Mason City, lessee.

Kan., Anthony—City engaged Black & Veatch, consult. engrs., Mutual Bldg., Kansas City, Mo., to make report, eight plant and waterworks improvements. **Maturity in spring.**

Kan., Topeka—Black & Veatch, consult. engrs., Mutual Bldg., Kansas City, Mo., making study pumping and electric generation capacity of municipal power plant with view of ascertaining additional generating equipment, for City.

Mass., South Hadley—Mount Holyoke College, M. E. Wooley, pres., sketches by architect at office H. French, 210 South St., Boston, 2 story, basement, 50 x 100 ft., brick, concrete boiler house, also three 350 hp. water tube boilers. $200,000.

Mich., Battle Creek—Kellog Co., plans by Albert Kahn, 1000 Marquette Bldg., Detroit, brick, steel, rein.-con. power plant for cereal factory, plain found. $75,000.

Neb., Ord—City Council engaged Black & Veatch, consult. engrs., Mutual Bldg., Kansas City, Mo., to make report outlining size and type power and light and water plant additions. **Maturity in spring.**

Okla., Seminole — City Council preliminary plans municipal electric light plant. $60,000. R. N. Geer, Seminole, engr.

Tex., Tahoka—Continental Chemical Co., c/o P. J. McIntosh, genl. mgr., Thomas Bldg., Dallas, soon lets contract five 1 story, brick, rein.-con. buildings, and 5 residences, 2½ story, 70 ft. high evaporating building, no roof, incl. pumping equipment, levee work and 28 mi. railroad to plant, near here. $1,600,000. Private plans, A. G. Shuttler, Chicago, Ill., assoc. archt. W. D. Alt, 301-D Thomas Bldg., engr. Noted Dec. 10.

Vt., Burlington—Home for Aged Women, 272 Church St., plans by F. L. Austin, 240 College St., brick heating plant, Church St. $450,000.

CONTRACTS AWARDED

Ill., Chicago—Chicago Union Station Co., 1st unit power house equipped with water tube boilers, forced draft, chain grate stokers, 1,600 hp. boilers, (16,000 hp. total capacity), on 14,375 sq.ft. site between Taylor St. and Roosevelt Rd., to serve Union Station, post office, adjacent railway facilities, to John Griffiths & Sons Co., 228 North La Salle St.; boilers, to Foster Wheeler Corp., 20 North Wacker Dr.; conveyors, to Link-Belt Co., 910 South Michigan Ave. Total est. $1,500,000. Work started.

N. J., Scotch Plains—Union Co., Court House, general contract altering and constructing 1 story, basement, brick, steel power house and garage addition, Bonnie Burns Sanitarium, to T. F. Conroy, 95 Tiffany Pl., Maplewood; plumbing, to A. Arace & Sons, 640 3rd Ave., Elizabeth; electrical work, to H. Schenck, 32 Meadowbrook Rd., Maplewood; steel, to Harco Steel Co., 1180 East Broad St., Elizabeth; sheet metal work, to M. H. Donovan, 31 Tillinghast St., Newark. Est. $40,000. Noted Nov. 13.

Tex., Borger—City, c/o J. R. Miller, mayor, municipal natural gasoline plant, incl. 40,000 lin.ft. gas mains, laterals, booster plant, to Jos. A. Greenspon & Sons, 3130 North Hall St., St. Louis, Mo., $125,000. Noted Nov. 12.

WAREHOUSES

PROPOSED WORK

Calif., Los Angeles—Loose-Wiles Biscuit Co., 811 Commerce St., Kansas City, Mo., plans by C. Beelman, 1019 Union Bank Bldg., 1 story, 140 x 220 ft., warehouse and garage, steel frame, steel sash, terra cotta, concrete, plate glass, rolling doors, loading platforms, decomposed granite paving, wire fence, steel ladder, settling tank, 600 Gage Ave. $40,000.

Calif., Pasadena — City Comn., plans by Marston & Maybury, 25 South Euclid Ave., 1 story, incl. machine shop, oil storage building, repair shop, general warehouse, 1103 Glenn Ave. $100,000. B. De Lanty, City Hall, engr.

Conn., New Britain—Hardware City Storage Co., 242 Main St., plans by Kingsley Serv. Co., 103 West 125th St., New York, and takes general contract bids late in June, 6 story, basement, 50 x 100 ft., brick, steel storage warehouse. Noted July 23.

Mass., Saugus—Owner, c/o R. S. Robie & C. A. Allen, 6 Belvidere St., Boston, 30 m.g. bulk oil plant, Saugus Marsh. $1,000,000. Private plans.

N. Y., New York—P. Garrick, lessee, 620 West 52nd St., altering 4 story, 25 x 100 ft. farm products building into storage warehouse, 532 West 48th St. $40,000.

N. Y., New York—Romike Realty Corp., J. C. Weil, 507 West 125th St., sketches by Jardine, Murdock & Wright, 347 Madison Ave., 72 x 100 ft. loft and storage, 1340 Amsterdam Ave. $40,000. Weil Bros. Hardware & Plumbing Co., lessee. Noted Nov. 5.

N. C., Greensboro—Swift & Co., Packers and Exchange Aves., Chicago, Ill., refrigerated storage plant. $40,000.

Ont., St. Catherines — St. Catherines Cold Storage Co., Davidson St., pre-cooling central packing and cold storage plant. $100,000.

CONTRACTS AWARDED

Calif., Los Angeles — Safeway Stores, Inc., 1925 East Vernon Ave., 1 story, 155 x 326 ft., steel, brick warehouse, steel and wood rolling doors, small refrigerating system, steel sash, wrecking old building, 1925 East Vernon Ave., to Clinton Constr. Co., 1103 Arcade Bldg. Est. $100,000.

Md., Baltimore—American Stores Co., 242 North 19th St., distribution plant, to Turner Constr. Co., Graybar Bldg., New York. Est. $125,000. Noted Dec. 10.

Mass., Malden—F. T. Niles, 40 Upland St., Melrose, 1 story, concrete, steel warehouse, 237 Commercial St., to F. E. Yeomans, 10 Newbern Ave., Medford. Est. $40,000.

Mass., Newton—Rohmer Wool Scouring & Carbonizing Co., 149 California St., altering and constructing 2 story, steel storage building addition, to Priggin Steel Building Co., Carlton St., Cambridge.

N. J., Trenton—City Comrs., general contract transit freight shed, to W. C. Ebret, Academy St., $45,787; structural steel, to McClintic-Marshall Co., 39 Bway., New York, $20,095; drain, to E. Giovachino, Paulsboro, $15,350; plumbing and water lines, to Burns, Lane & Richardson, 41 Adams St., $4,226; electrical work, to P. C. Peifer, 120 West State St., $1,256; heating, to P. S. Slack, 219 Perry St., $1,271. Grand total $87,985. Noted Nov. 25.

See proposal advertising on page 58

Public Construction Projects Held Up in Massachusetts

62 Projects Worth $26,000,000

Public Buildings to Cost $150,000 or More

SCHOOLS

Milton	No funds; $300,000
Plymouth	Indefinite; $250,000
Raynham	Indefinite
Revere	Sketches made; $300,000
Roxbury	Plans incomplete; $1,500,000
Saugus	Preliminary plans; $400,000
Swampscott	Voted postponement for 1931; $250,000
Waltham	Plans incomplete
Waltham	Architect not selected; $1,000,000
Wellesley	Architect not selected
Wilmington	Indefinite

State school for feebleminded; site not selected
High School, West Roxbury; Indefinite
Cambridge, 2 high school units; indefinite; $500,000

Andover	Indefinite
Jamaica Plain	Indefinite
Malden	Preliminary

OTHER BUILDINGS

North Adams, library, $250,000
Waltham, library, Mass. Agric. College; indefinite, $175,000
State police barracks at Middleboro or Bridgewater; site not selected
Boston, supreme court; preliminary
Boston, fire station Back Bay district; indefinite
Boston, municipal building; site not selected; $400,000
Boston, memorial in Back Bay Fens; architect not selected; $1,000,000
Boston, police station Hanover and Joy Streets; indefinite; $350,000
Boston, police station Lagrange and Dedham Streets; indefinite; $350,000
Boston, police station Richmond and North Streets; preliminary; $350,000
Cambridge, memorial; indefinite; $1,000,000
Arlington Heights library; indefinite
Charlestown, municipal building; indefinite; $400,000
Chelsea, soldiers home; preliminary; $300,000
Grafton, hospital unit; indefinite
Lakeville, infirmary; indefinite
Natick, courthouse; indefinite; $150,000

WATER-WORKS

Amesbury	Reservoir at PowWow Hill; indefinite; $100,000
Medford	Mains; no appropriation; $65,000
Bourne	System for Buzzards Bay; insufficient funds; $15,000
Norwell	System; indefinite; $15,000
Paxton	System; insufficient funds; $15,000
Raynham	System; insufficient funds; $200,000

SEWERS

Barnstable	Sewage disposal; no funds; $250,000
Mattapoisett	System; indefinite; $110,000 approp

BRIDGES

Mystic River,	Charlestown-Chelsea; no funds, $150,000
Medford	State over Mystic River from Revere; indefinite; $400,000
Framingham	State, over Sudbury; indefinite; $25,000
Lynn	State, over Saugus; plans not ready; $25,000
Pt. of Pines	State, Lynn-Revere; site not selected; $850,000
Boston	State, to Hull; indefinite; $25,000

GRADE CROSSINGS, STATE AND B. & M. R.R.

Ashburton	Overpass, B. & M., no appropriation; $50,000
Millis and East Brewster,	2 overpasses; no appropriation; $110,000
Waltham, Winchendon, Newbury;	3 overpasses, no appropriation; $730,000
Bernardston-Northfield;	overpass; no appropriation $25,000
Ayer	Underpass; indefinite; $300,000
Mansfield	Central St., N. Y., N. H., & H.; no funds, $2,000,000
Cheshire	Overpass, N. Y. Central; indefinite

Construction Exclusive of Buildings

MISCELLANEOUS CONSTRUCTION

Boston	Filling South Bay and Roxbury Canal; preliminary; $7,000,000
Boston	Stadium, Dunbar Ave.; postponed; $100,000
Bourne	State pier; action delayed; $25,000
Fall River	State pier; site not selected; $40,000
Boston	Playground at Rogers Park; no funds; $25,000
Boston	Reconstructing North End playground; delayed; $25,000
Boston	Playground, Gallivan's Grove, West Roxbury; no funds; $100,000
Boston	State park along Charles River embankment; no appropriation; $2,000,000

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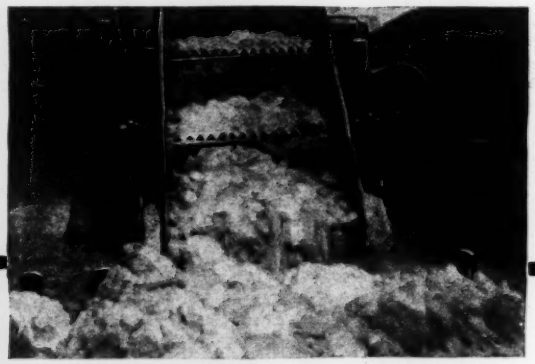
More Loads per Day

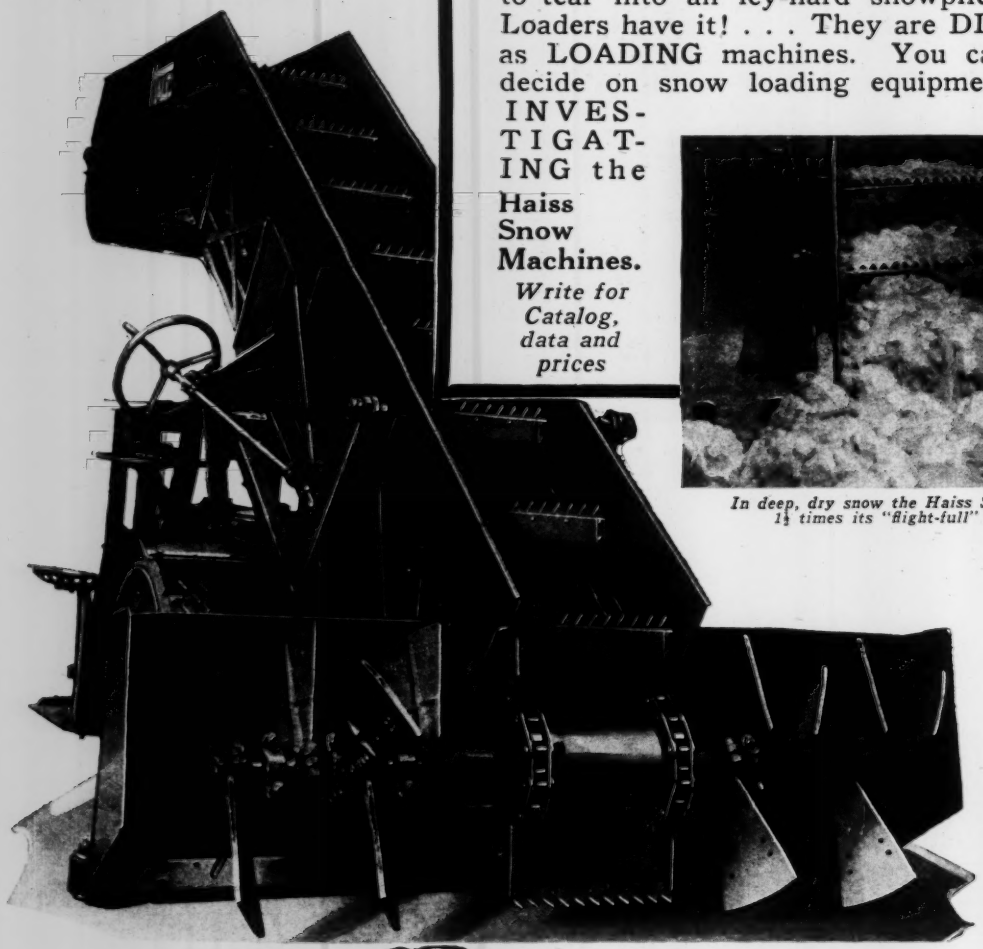
in any snow condition

The big reason for buying a mechanical loader is to SPEED UP THE NUMBER OF TRUCK TRIPS per day. What you need then is a machine that will do that job REGARDLESS OF THE SNOW CONDITION. You need power to dig soggy wet or frozen snow. You need digging ability to tear into an icy-hard snowpile. Haiss Snow Loaders have it! . . . They are DIGGING as well as LOADING machines. You cannot afford to decide on snow loading equipment WITHOUT INVESTIGATING the **Haiss Snow Machines.**

Write for Catalog, data and prices



In deep, dry snow the Haiss Snow Loader handles 1½ times its "flight-full" rated capacity.



The outstanding advantage of the Haiss Snow Loaders is the powerful digging mechanism evident in this photograph . . . . TWO MODELS Model 50 (Wheel Mounted) and Model 27 (on Creeper Treads).

GEO. HAISS MANUFACTURING CO., INC.
140th Street & Rider Ave., New York, N. Y.

HAISS SNOW LOADERS

Also: HAISS "EXCAVATOR"—THE HAISS LOADERS—PORTABLE BELT CONVEYORS—CLAMSHELL BUCKETS